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AUTOMOTIVE INDUSTRIES
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VOL. XLIII NEW YORK—THURSDAY, AUGUST 19, 1920 No. 8

How the Industry Can Help to Build Its Best Market

The farm has established itself as the best buyer of motor cars. It is expected to become the best market for trucks and is, of course, practically the only market for tractors. This article is presented without prejudice merely to point out a method of profitable harmony between industry and the farm.

By Neal G. Adair*

STATISTICIANS like to cite the farm as the country's greatest potential market for a long list of manufactured products. Manufacturers, naturally, are more concerned in measures to transform this market from a potential to an active stage. This is especially true of the automotive industry, which looks to the farm to absorb a large share of the tremendous production scheduled for the current decade.

The farm market will progress from a potential to an active basis in direct ratio to the increase of farm resources. And farm resources will be built up—

1—By better farming methods, bringing about increased production per unit of tillage effort.

2—By prices for farm products yielding a fair return on investment and labor.

The automobile has been heralded as a powerful agency in checking the migration from farm to city. There is no argument over its potency in this respect, nor over the certainty that trucks and tractors, as well, have contributed and will continue to contribute with growing strength to prosperity and contentment for the farming population. The automobile has saved many a farm from abandonment by bringing the farmer and his family in touch with the advantages of town life. It will save many more and with the truck and tractor will be a revolutionizing factor in the advancement of American farming—how great a factor depends upon the question of resources already mentioned and upon good roads, which in turn are bound up in the problem of farm resources, because an impoverished agricultural section will always oppose, and with a certain amount of short-sighted justification based on self-protection, the financial burdens of highway improvement.

Because of these conditions the automotive industry is more than casually interested in some recent developments, political and economic, affecting the farm. One has to do with Congressional action, another with the important question of prices for farm products, which are

*Editor Motor World.

not putting the agricultural population in the millionaire class quite as rapidly as popular opinion in the cities would seem to indicate.

When Congress adjourned a few weeks ago the country breathed a sigh of relief. The country does that as regularly as Congress adjourns. It is a habit. Unfortunately, the country, generally speaking, has not developed the habit of weighing on the scales of national welfare the results of Congressional action.

Under the circumstances it is not surprising that there was little more than passing comment on Congress' reduction of the agricultural appropriation to a figure $6,000,000 less than the Department of Agriculture's estimate of its needs and $2,000,000 lower than the current year's allowance.

What Congress has done is done, but there will be more Congresses. And before another sits there ought to be found a way to bring about keener appreciation on the part of the public of the purposes of agricultural appropriations and of the inevitable results of their restriction beyond a point of reasonable economy. There ought to be particularly an awakening of the manufacturing interests to the direct bearing of federal agricultural appropriations on the market for manufactured products.

To the American farm goes a large share of the output of American factories. Especially is this true of the automotive industry. Farmers own 40 per cent of the automotive vehicles registered in the United States, and the National Automobile Chamber of Commerce estimates that 60 per cent of the automobiles now in process of manufacture will be bought by farmers.

Because of this and because the farm market will expand in direct ratio to the increase in farm resources, the automotive industry is interested in the Government attitude toward agriculture. There is no necessity to debate the merits of the Agricultural Department's budget for the coming year. It is sufficient to note that the curtailment of funds below the total of the current appropriation will force the Department to dispense with the services of several thousand men trained in research, investigation and development work conceded to be an asset to American agriculture.

The number and classification of men to be released has not been announced, but it goes without saying that there will be necessary a wide restriction of Government activity on and for the farms. And such restriction inevitably means a slackening of progress toward the day of ideal farming, which, in turn, entails a slowing up of the process of building farm resources. Translated into terms of buying ability, a farming community set back in its onward, upward movement through diminishing of the accelerative power of Government assistance in the solving of the farm problems is not going to absorb as rapidly or as fully as had been anticipated the merchandise scheduled to go its way.

The Curtailment

According to a statement just issued by Secretary of Agriculture Meredith, the department will be forced to discontinue all its crop report activities except the routine monthly statements of acreage, condition and production of staples. Special reports, declared by the farming interests to have been worth millions of dollars to growers of cotton, rice, tobacco and apples, will be abandoned.

Work to be materially curtailed, the statement says, includes:

Eradication of animal diseases.
Research into cereal diseases.
Forest investigation and experimentation.
Markets development, with special attention to standardization of the efforts of the states.
Soil survey.
Forest and plant insect control.
Dairy investigation, with the object of improving dairy conditions and encouraging cattle raising in cereal states.
Eradication of the pink bollworm, enemy of cotton.

The setback to be given the better farming movement, which is synonymous with greater farm resources and increased farm buying power, as a result of this action of Congress, can best be understood through reading of some of the salient paragraphs from Secretary Meredith's report, touching a few of the Department's activities, as follows:

Animal Industry.—"There is a reduction of $304,000 in the appropriation, which will affect many lines of work. For example, we have this year $446,865 for field work in connection with the eradication of hog cholera. The appropriation for next year is only $192,200. There was a time when the annual loss from this disease was 144 head to the thousand. Since the eradication campaign was launched the losses never have exceeded 67 and they have been as low as 42 per thousand. It is perhaps not too much to say that eradication work is saving the farmers of the United States $40,000,000 a year. This work, as far as Federal assistance is concerned, will have to be abandoned in several states, and this and other investigative and control work in connection with animal diseases will have to be curtailed."

Dairy Investigation.—"The Department will have to abandon its cow-testing work in Ohio, Indiana, Iowa, Minnesota, Nebraska, Pennsylvania, West Virginia, Rhode Island, New Jersey and Connecticut. It must discontinue also the work it now has under way to improve the quality and increase the use of dairy products in Iowa, Kansas, Mississippi and Louisiana, and will have to withdraw from co-operative dairy extension work in Nevada and Wyoming."

Cereal Research.—"Stations (in nine states) will have to be closed because of the impossibility of continuing the work under present high prices with the already inadequate appropriation, which has been reduced by $80,000."

Pink Bollworm.—"The appropriation for the eradication of the pink bollworm of cotton has been reduced by $100,000. The pink bollworm possibly is the most destructive enemy of cotton in the world. It has inflicted tremendous damage to every cotton-producing country on the globe, with the exception of the United States. It is present in this country in a few counties in Texas and in three parishes in Louisiana. With the full co-operation of the states concerned, the opportunity now exists to eradicate it. If it is not eradicated now it will inevitably spread over all the cotton-growing territory in the United States, and will undoubtedly cause enormous losses.

"The Department is pursuing the only program that promises success. The work is already well under way and the prospects for complete eradication are distinctly favorable. Half-way measures will, almost certainly, mean money and work wasted. Such work cannot be adjusted so that it will cost a fixed sum. It must be maintained on a basis which will insure the accomplishment of the end aimed at. It is like fire control or the maintenance of levees. It cannot be dropped and later taken up again. As soon as vigilance is relaxed the opportunity for control is lost. The reduction in the appropriation will make it impossible for the Department to prosecute its efforts to eradicate the pink bollworm on

the scale which the experts think necessary in order to insure success."

Co-operative Marketing Work—"Through the employment of field agents in various states, important progress has been made in developing broad, consistent marketing policies. Without assistance in co-ordinating the activities of the various agencies, each state will undoubtedly develop its marketing work in a different way, and confusion and waste will be inevitable. The study of marketing problems on a comprehensive scale was undertaken so recently, and authoritative information is consequently so meager, that it is particularly important to give state agencies the benefit of such conclusions as have been reached by the Department and such states as have undertaken work along these lines; otherwise, they cannot avoid costly mistakes and loss of time. We are at present co-operating with 28 states and had expected to extend work to the other states.

"The appropriation for this work, however, has been reduced and its expansion, which seems so essential at the present time, will have to be postponed until funds are available."

General—"It is impossible, in this statement, to indicate in detail all the lines of work that will be affected by the reductions made in the Department's appropriations for next year, and, of course, it does not take into account the projects which the department feels, as indicated in the estimates submitted to Congress, should be inaugurated or expanded in order to deal more effectively with important problems in the field of agriculture. Many important activities in addition to those mentioned will necessarily have to be curtailed, including investigations in the culture and improvement of forage crops, studies of live-stock production in sugar-cane and cotton districts, work in the control of the potato-wart disease, field experiments in the various methods of road construction and maintenance and investigations concerning road materials, farm irrigation investigations, and farm drainage investigations.

"All these reductions are much more serious than appears from a mere dollars and cents statement. A dollar, as we all know, buys much less of everything than it formerly bought and also does considerably less work. Even if all the appropriations had been retained at the old figures, therefore, the Department would have been seriously handicapped in carrying on its work effectively."

Widespread Effect

Partial tying of the hands of the Department of Agriculture in this manner obviously is going to have a countrywide effect along lines which do not need explanation —on the farming community, on industries which sell to the farms, and on the general public. What the farmers think of the curtailment has been generally expressed through the farming organizations, which were heard from before, during and after the Congressional action. What industry and the general public think of it is yet to be clearly stated. On the manner of its stating will depend, in a degree at least, the attitude of future Congresses toward the country's agricultural development. All of which makes the farm question not one solely for farmers, but one for the nation as a whole and particularly for the manufacturing interests which find a considerable part of their market on the farms.

In particular is industry, and in these columns attention may as well be centered on the automotive industry, likely to be interested in a farm betterment movement which came under the writer's observation in the South, admittedly a tremendous potential market for automotive products. The South is buying cars and trucks in huge quantities and tractors and other merchandise of the industry in considerable volume, but its purchasing power is still in an embryonic stage. The development of the Southern market undoubtedly is dependent more than in any other section on improvement of farm conditions, blazing the way for better roads and increased resources necessary to expansion of its purchasing power.

Future of the South

The South is going to become the market that it can become for automotive products when the cotton grower, backbone of a territory that contains a third of the country's population, gets a profitable price for his crop.

Poor roads, illiteracy, poverty and disease—enemies of economic independence—prevail in many sections of the South because the cotton farmer, even in these days of high cotton prices when the product gets to the consumer, is not getting a fair price for the yield of his soil. They prevail because he has never received a price, according to authorities on the subject, which would lift the cotton grower, employer and employee, out of a condition of economic slavery.

After 60 years without organization, the cotton farming industry has been organized. The American Cotton Association, now getting fairly on its feet as a protective, development force, has recruited 250,000 members in 14 states, recruited them not from the upper strata of the cotton farming class, but from growers rich and poor, with dues running down to a minimum of $3 a year to make the movement all-inclusive. It is tackling the grower's problem at home, to improve farming methods, and it is going direct to the throne of cotton—the World Cotton Congress to be held in London next year—with its demand for recognition of the farmer in the apportionment of benefits of the industry.

With the South producing to-day 60 per cent of the world's cotton, American business may well take a sympathetic interest in the ideals and activities of the American Cotton Association. Business can readily see what the purchasing power of the South would have been if the grower had received a fair share of the profits and what it can be when this condition is brought about, in the following statement of J. S. Wanamaker, president of the American Cotton Association:

"Had the producer received anything like a fair price for cotton during the past 60 years it would have brought an enormous enrichment to every section of the cotton-producing region. It would have meant rural conditions second to none on the globe; it would have meant better roads and better farming conditions; the deplorable illiteracy which exists in many sections of the South would have been unknown.

"Had the producer received a fair price for his cotton the South to-day would have been humming with machinery and the bulk of the American cotton crop, instead of being shipped largely in its raw form, would have been going to the markets of the world as a manufactured product, bringing to the South and to America an enormous increase in wealth and making this nation the world's banker.

"The manufacturers have been reaping golden harvests. Based upon every known economic law, cotton has not sold within the past year within 100 per cent of a fair price. That enormous profits are being earned by the manufacturer is common knowledge, and based upon supply and demand, the producer should have received far higher prices than the highest price paid for raw cotton."

Raw cotton prices, Wanamaker says, are based on those which prevailed before the labor of the cotton fields was changed from a slave to a wage basis. His association, in addition to fighting for a fair return to the grower, already has undertaken wide encouragement of co-operative marketing and warehousing facilities, improvement in the methods of growing and handling the crop so as to cut producing costs and an active propaganda, already taking root in the South, to introduce into American colleges courses on the business side of production.

The writer traveled recently over hundreds of miles of roads in several sections of the South, particularly the cotton and tobacco lands of Virginia and North and South Carolina. He found these roads, in the majority of cases, so poor that credit must be given the automobile industry for selling its products in these sections in spite of poor roads.

He found wide regions practically without hope of building permanent highways for years to come, not because the people, even the non-automobile-owning classes, do not want good roads, but because in their condition of pitiable poverty they are without the resources to construct and maintain them.

He found labor, by the thousands, going north because of inadequate wages and unthinkably poor living conditions enforced by the average employer's lack of resources. The tobacco growers are in a stronger position, because they have shared in the benefits of the tobacco boom, but the cotton lands need development, which can come only with outside recognition of the need of it, before they can attain the economic independence necessary to make them the big factor they should be in the progress of the nation.

The lesson of history—the fall of nation after nation which has turned its back on agriculture—ought to be sufficient to arouse American industry to the needs, not only of the South, but of our entire farming country, in the way of development. It ought to prompt a more general and more active interest in the problems of the farmer. It ought to make impossible any governmental action, in the name of dollars and cents economy, which would cripple research and assistance intended to build up the resources of the nation's farms.

There are things that business, and particularly the automobile business, can do to accelerate the upbuilding of farm resources necessary to the expansion of the farm market. There is the possibility, yes the need, of national advertising of the tractor. We have had country-wide advertising, of course, for individual makes of tractors, but there has been no great publicity movement to convince the whole people of the possibilities of development latent in the power farming idea.

There could be and should be, on the part of industry, active support of every movement, state or national, for educational advancement and for market improvement such as that being worked out by the Federal Markets Bureau of the Department of Agriculture.

There should be not mere support by resolution, but a real putting of the shoulder of industry to the wheel of good roads, in states and in the National Highway Plan contained in the Townsend bill.

There should be real effort to crystallize sentiment for legislation, long talked of, to put the marketing of cotton on a business instead of a speculative basis.

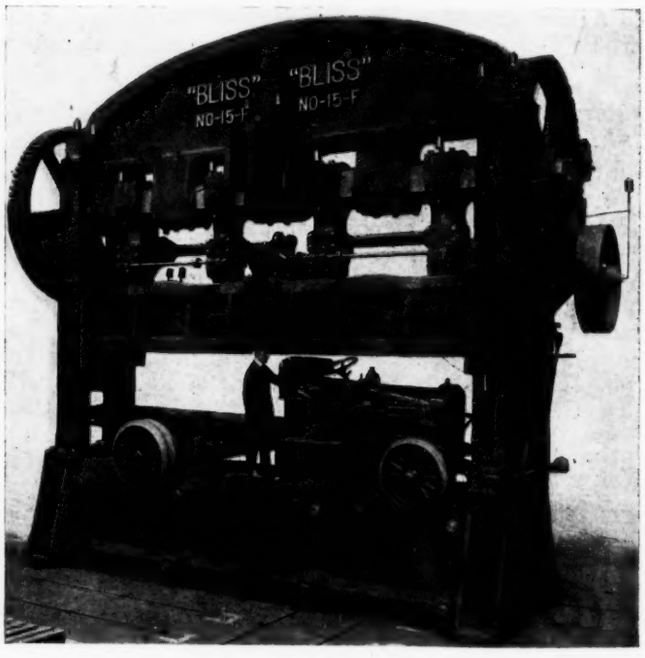
Above all there should be constant activity by business to put business in government. The tremendous power of the automobile industry alone, if properly directed, could work wonders in improving the quality of legislators and of legislatures, state and national. If the voice of industry was heard as emphatically in support of the general progress movements mentioned as it is heard on matters of exclusive industrial interest there would be less trifling in high places with the welfare of great groups of our people not wholly competent, for various reasons, to fight their own battles.

Crank Press Has Unusual Dimensions

A CRANK PRESS of unusual size and power for the blanking and perforating of side rails for truck frames has recently been built and put into operation by one of the larger automobile companies. The machine is twin-driven, triple geared, the gears being of steel. Something of the size may be understood from the following dimensions:

Area of bed	252 x 48 in.
Area of slide face	242 x 40 in.
Number of strokes per minute	5
Total height	25 ft. 9 in.

The accompanying illustration shows the press as it has been installed by the makers, the E. W. Bliss Co. The Pierce-Arrow truck chassis is inserted into the press merely to give an impression of its size.



A new and unusually large crank press for automotive use

A VOLUME of rather surprising size and contents has just been issued as "The Aeronautical Directory of the World." It is compiled by the Aeroplane & General Publishing Co., London. The contents of the volume is merely a listing of firms by countries. The introduction calls attention that this is the first effort of the kind and that there are probably omissions, but that it is hoped to bring the lists to a fair degree of accuracy as the industry becomes settled.

Truck Manufacturers Favor Hub Standardization

Strongly indorse movement launched to limit wide variety in size and design. Report made to Automotive Metal Wheel Association meeting indicates definite progress is being made by committee appointed at Atlantic City to draft front wheel hubs. To meet again in October.

By J. Edward Schipper

CONSIDERABLE interest is being aroused among truck manufacturers regarding the possibility of the standardization program of the wood and metal wheel associations. These organizations have entered upon a determined campaign to reduce the present chaotic wheel hub situation to something like order, and incidentally to materially cut the amount of capital required for jig and fixture equipment necessary to the manufacture of wheels for future axles.

It was pointed out in the April 1 and April 29 issues of AUTOMOTIVE INDUSTRIES that a great many benefits would accrue to both the axle and wheel manufacturers, if it were possible to reduce the number of front and rear hub designs for both passenger cars and trucks so that it would be possible to interchange any make of wheel on any make of car or truck of a given weight rating. A combined meeting called by the Automotive Metal Wheel Association and attended by the wood wheel organization and representative axle manufacturers was held in Atlantic City in June and at that time the movement took on definite form. A committee under the chairmanship of Cornelius T. Myers was appointed to attack the front wheel situation first, as being most capable of solution.

Since that time interest in the work has been spreading through the industry, and particularly among truck manufacturers. It is believed that at this time we are right on the verge of considerable design work in axles, particularly for pneumatic trucks. Without standardization, practically every manufacturer will have a different wheel mounting for these new products, necessitating additional dies, jigs, fixtures and all the necessary tool equipment on the part of the wheel manufacturers to meet the requirements for wheel mounting. This all means additional expense, as it is estimated that it costs up to $3,000 for each manufacturer to tool up for the manufacture of a given type of hub. This expense is naturally passed on to the truck manufacturer and by him to the consumer.

Even if the front axle spindle problem alone were solved, it can readily be seen what a tremendous reduction would be made in the cost of manufacture. These would be fixed on the new products and the cost of design work would also be materially reduced. There would be no necessity for the introduction of an entirely new set of manufacturing equipment in the plant of each manufacturer.

This situation is realized fully by progressive truck manufacturers who are eagerly awaiting action by the committee of the wheel manufacturers which is working in co-operation with the Society of Automotive Engineers. In a recent letter J. R. Coleman, who is in charge of engineering and production at the Selden Truck Corp., Rochester, stated: "There is nothing we can say that would be too strong in expressing our sympathy with this movement. This was brought up strongly by me in the S. A. E. truck standards committee meeting because of the absolute necessity for it.

"Now that steel wheels are being successfully made, and are becoming a very important branch of our industry, the producers must be given all the assistance possible to cut down their cost of production. This standardization will also give complete interchangeability which will assist in keeping motor trucks in operation. This movement should be given the aggressive support of all interested in the success and prosperity of the truck business.

"The greatest handicap that the truck manufacturer has had to encounter has been the lack of quantity production. Quantity production is, as we all know, the secret of low cost of manufacture, which makes it possible to give the ultimate user the maximum value for his dollar. Standardization is a most important factor in obtaining quantity production and it should be greatly fostered."

The remarks of Coleman are fairly indicative of the stand of the truck manufacturer on this point, whether he makes his own axles or purchases the units from an axle manufacturer. This attitude is by no means confined to a few, and similar views are expressed by Chas. Guernsey, in charge of engineering at the Service Motor Truck Co., Wabash, Ind., who writes:

"It is impossible for us to be too emphatic in stating our approval of this work (hub standardization). We believe that it should be possible to carry the standardization even farther than is at present contemplated. We see no reason why a series of standard front wheel hubs cannot be developed, each for a specific load capacity, such that not only the wheels will be interchangeable but even the hubs and bearings.

"To a somewhat lesser extent the same is true of rear wheel hubs. In this case, however, it will be necessary to standardize on two types—one of the full floating and the other for the fixed hub or semi-floating type. Undoubtedly a considerable time will be required after the adoption of the standards before the full benefits can be felt. However, as rapidly as new designs in the various sizes are brought out by the various companies it should be possible to swing over to the standard types."

These two expressions of opinion, chosen at random, show that the truck manufacturer, who deals with the parts maker on the one hand and the general consumer on the other, is deeply interested in the accomplishment of this standardization work. At a meeting of the Auto-

(*Continued on page* 379)

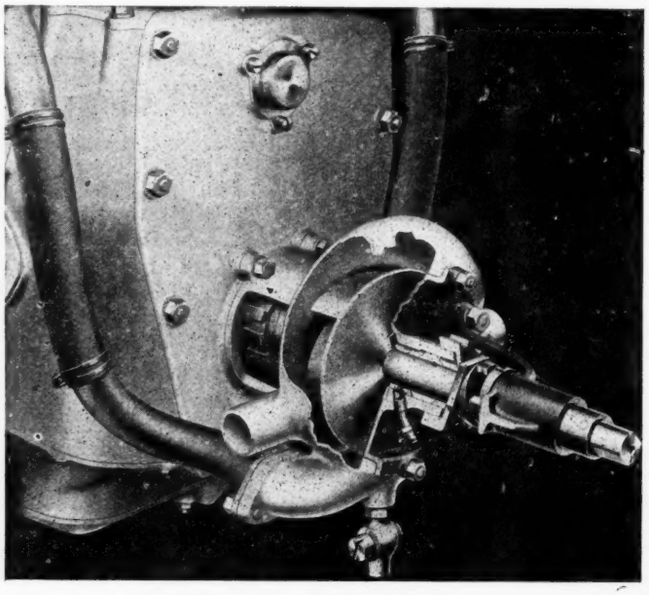
Eight-Cylinder Automobile Has Light Weight Feature

This description of the LaFayette eight gives the details of construction which heretofore have been withheld. In addition to the light weight the power is very high and the flat torque curve gives easy acceleration and hill climbing ability. This model is in production and delivery started.

By J. E. Schipper

WITH production practically on a routine basis and deliveries to dealers just commencing, considerable interest is held in automotive circles regarding the full details of the new LaFayette car. The car was first disclosed at the New York show in January and at that time a few mechanical specifications were released, but the full engineering details of this entirely new product, designed by D. McCall White, formerly chief engineer of the Cadillac Motor Car Co., are herewith given for the first time in detail. It is the intention of the LaFayette Motors Co., which is financed by the Nash interests, to build 2000 of these cars this year. The original intentions called for 3000, but the material situation and the slowness of delivery on certain parts has caused the reduction.

From an engineering standpoint, White has produced in this car a product of advanced design. By the extensive use of drop forgings and the selection of the best materials available, it has been possible to produce a 132-in. chassis with an eight-cylinder engine, peaking around the 100-hp. mark, which weighs, with oil in the engine, gearset and rear axles, but no water in the radiator or gasoline in the tank, 2574 lb. This light weight, taken in connection with an engine having a torque curve which is practically flat from 800 to 2500 r.p.m., gives a torque-weight ratio so high that hill climbing and accelerative performance is exceptional. It is possible in high gear to slip the wheels on dry pavement and the writer, while driving one of the first production cars, found a speed range from two to well over 60 m.p.h. on high gear.

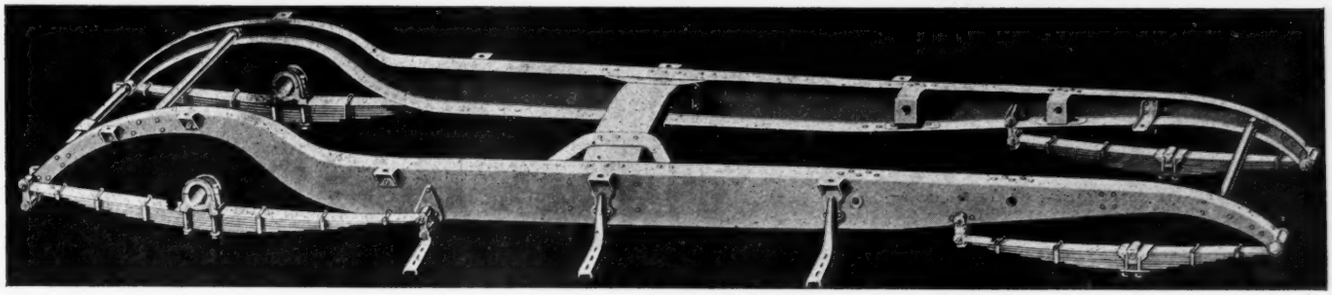


Dual water pump

Weight has been saved throughout the car by a simplification of details and by allowing one part to perform the function of two or more where possible. This has been applied to the powerplant as well as to other parts of the chassis. The engine is 3¼ x 5¼ in., cast in two blocks of four, with detachable heads. The two blocks are set at an angle of 90 deg., and to increase the accessibility in the valve alley the valves, which are located in the V, are set at an angle of 9 deg. to the axis of the cylinder, giving a total included angle within the V of 108 deg. This wide angle allows the valves to be readily reached from above and additional simplicity is gained by the use of directly actuated valves, the camshaft being directly above the crankshaft with the cams bearing directly on the roller followers, without the use of fingers or bell cranks to actuate the valve mechanism. This construction is shown clearly in the sectional view of the engine. Another feature which is of interest in connection with the valve action is the use of tubular parts for lightness.

The cylinder blocks are cast of alloyed iron, heat treated to give them considerably more hardness than the pistons, which are also gray iron castings. It is the purpose of the heat treating and alloying to make the piston softer than the iron cylinder so that in case of seizure the cylinders will not be scored. Tests have shown that where seizure occurs in the hardened cylinders, particles of the piston adhere to the cylinder walls and it is not necessary to increase the diameter of the bore in removing the adhering metal, as the scoring does not affect the cylinder wall.

The cylinder castings are also noteworthy from the fact that they are very simple and have exceptionally large water jacket spaces, particularly around the valves and around the exhaust manifold. The water is not baffled, but is allowed to rise up around the entire cylinder. The pistons are gray iron castings, also heat treated, but, as stated, are softer than the cylinders. They have three rings all above the piston pins, and two oil grooves, one at about the center and the other at the bottom of the piston, these grooves being in peripheral ribs within the piston. The piston and rings alone weigh 2½ lb. The piston pins weigh 2½ oz., and are of tubular steel, case hardened and ground, and secured in the piston. The connecting rods are high carbon steel forgings, the single connecting rods weighing 2 lb. 2⅜ oz., and the forked connecting rods 2 lb. 2⅞ oz. These rods are noteworthy for



Perspective of LaFayette frame

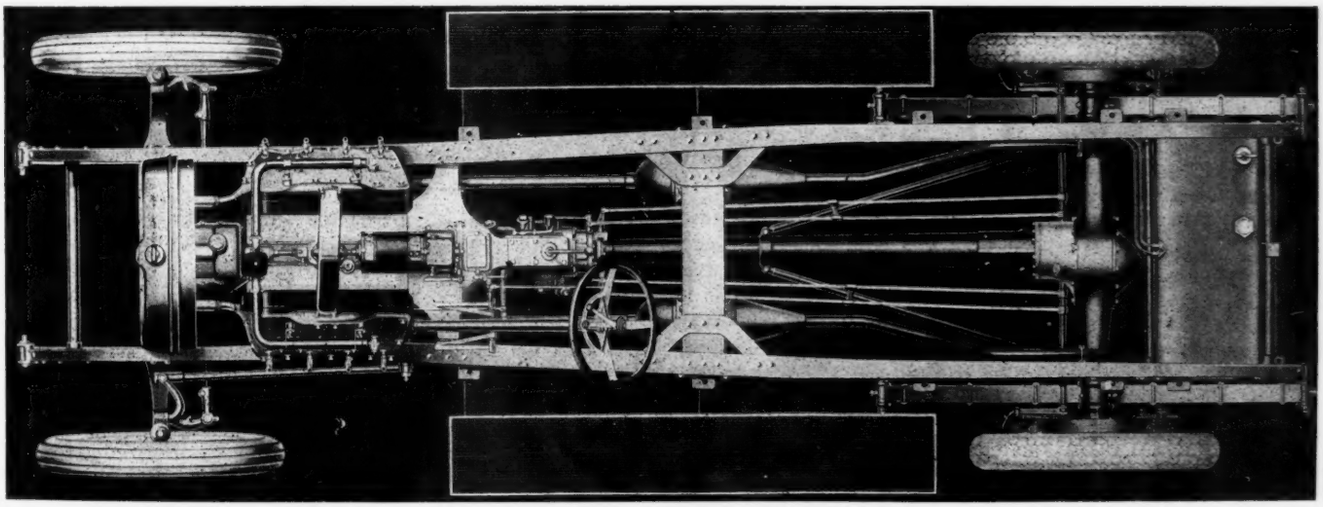
the completeness of the machining. There is not a part of the rod which is not machined down to its final dimension and no excess metal is left anywhere on the rod. They are straight, I-beam section, 12¾ in. from center to center, this length giving an angle of oscillation of the straight rod on the bushing of only 33 deg. 44 min.

Probably one of the most remarkable pieces of work in the entire car is the light weight crankshaft, which, although a five-bearing type, 2¼ in. in diameter, weighs only 30½ lb. This light weight is, of course, achieved by the hollow section, the shaft being a forging of chrome nickel steel. The babbitt-metal bearings upon which the crankshaft is carried are of the same analysis as that used in the Government aircraft engines. The bronze backings of the main bearing are made rigid by deep ribbing and the babbitt lining is finished by hand scraping and polishing in place of the machine finish generally given to bearings.

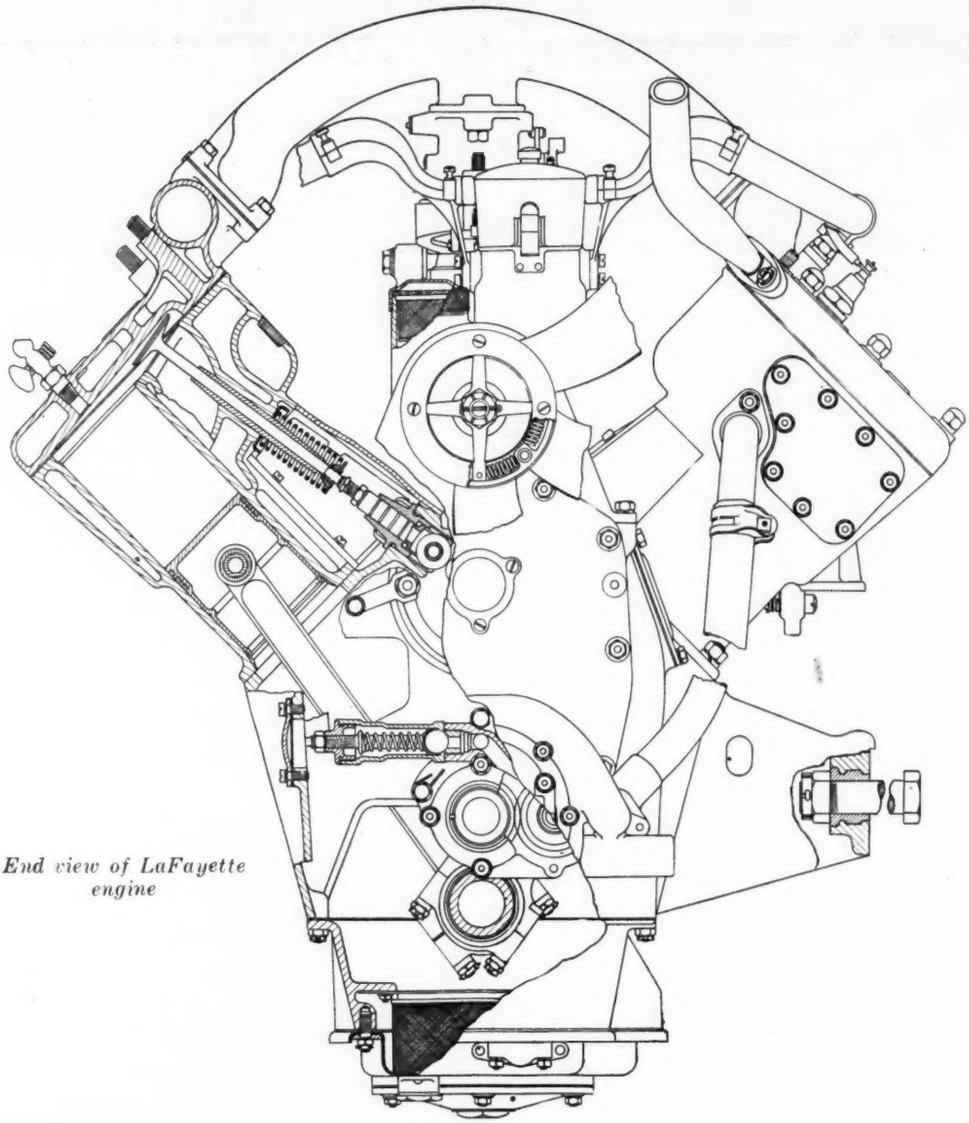
Airplane practice is also followed in the camshaft, which is a single, Liberty engine type, hollow throughout the entire length, and which, with its sixteen cams, weighs only 7½ lb. An interesting part of the camshaft mounting is that the same bridge structure (formed by webbing in the crankcase), which carries a main bearing, also carries a camshaft bearing, which is thus also mounted on five bearings. The camshaft is 1½ in. in diameter and has a wall thickness of ⅛ in. The camshaft bearings are cast iron, lubricated by oil under pressure, which, in combination with the hardened steel shaft, should give exceptionally long life. The camshaft is driven by silent chains and the fan shaft is driven off the end of the camshaft in the same manner. These chains are readily adjustable and are in direct line of the pressure oil feed, both of these features being factors in lengthening the life of the chain drive.

The cams are of the straight, tangential type, designed particularly for quick lift and silence. The valves are so timed that the intake opens on upper center and the exhaust closes on upper dead center. The valves are forgings of tungsten steel. The valve diameter is 1¾ in. and the lift ⅜ in. One of the features of the valves is the long stems with guides which surround the valves for an exceptionally large percentage of their total length. The valve stem length is 6.3 in., and the valve guide length 4.8 in. The valve guide is surrounded entirely by water jacket space for approximately one-half its upper length. The valve springs are single type and the push rods are hollow with an adjusting screw at the upper end, accessible by removing the cover plate from the inside of the valve alley within the V. It is interesting to note that the valves are also of the Liberty engine type with the heads and stems integrally forged and having grooved ends on the stems to give a good grip on the collars. The valve roller pins are hollow and extremely light. The valves themselves weigh only 4½ oz., giving an exceptionally light assembly and, consequently, quick action on the cams.

There are a number of weight saving and ingenious features in the lubricating system which are original on the LaFayette. The system is fundamentally a pressure circulating type and is operated by a patented oil pump driven directly from the crankshaft. The driving gear of the oil pump, in fact, is a part of the shaft, being keyed to it at its front end. The housing carries an idler gear, thus eliminating the necessity of an additional shaft with its bearings and driving mechanism. A feature of the oil pump is a very close fit between the oil pump gears and the sides of the case so as to assure delivery at low speeds. Another feature of the oiling system is the effort to increase the life of the oil by only circulating what is needed for lubrication. The pressure relief valve



Plan view of LaFayette eight-cylinder chassis



End view of LaFayette engine

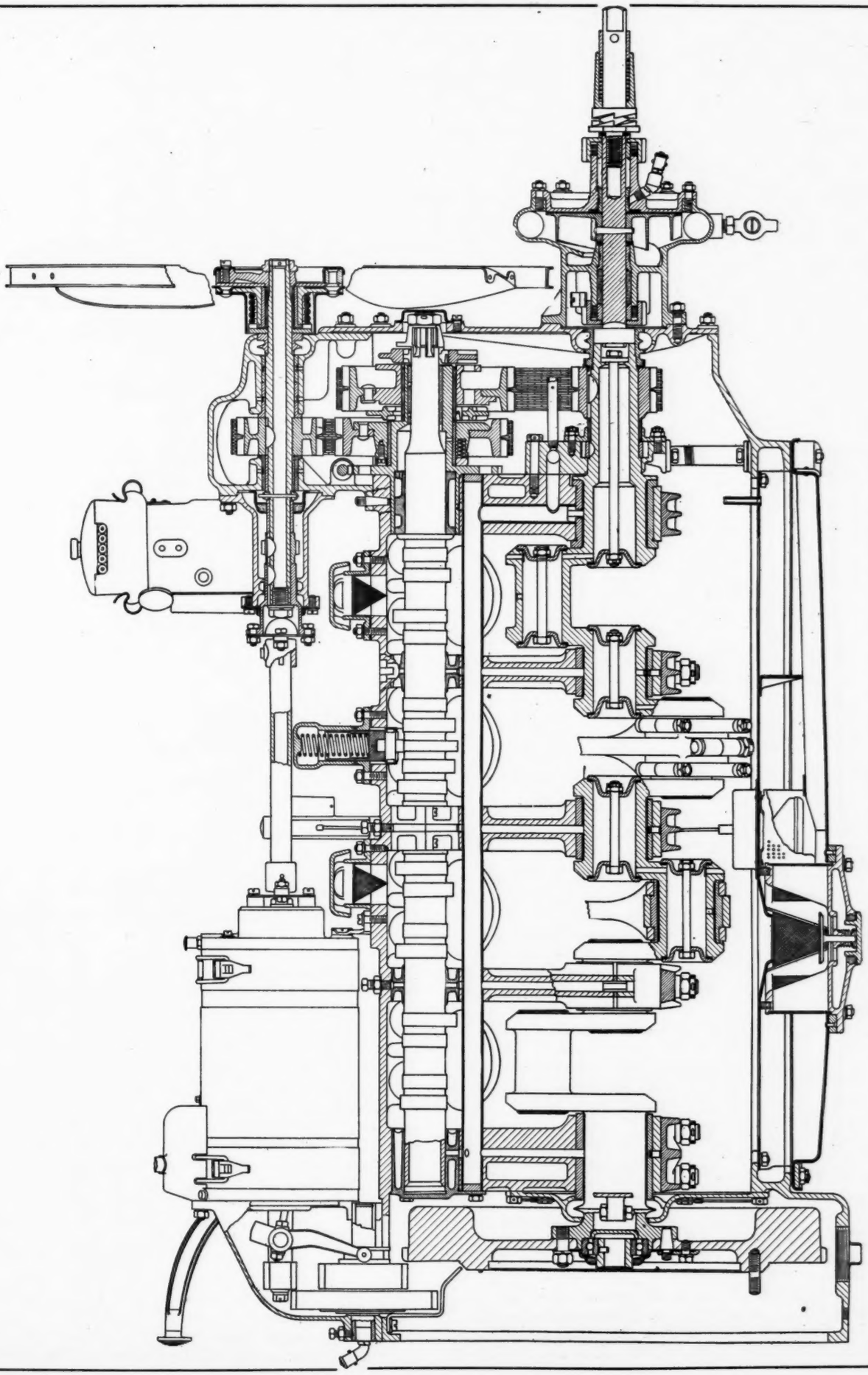
is integral with the oil pump assembly and any overflow from the valve returns directly to the oil pan and does not circulate through the system. There is no splash in this system, the oil all being contained in an oil pan below the reach of the lower ends of the connecting rods. The system is entirely self-contained, as there are no extension pipes whatever, except that which goes to the dash to indicate the oil pressure. There is a flexible connection from the oil pump to the suction pipe in the oil pan. The oil level gage, with the indicator at the left side of the engine, is high enough to be readily visible, and at night is illuminated by an engine lamp.

The hollow crankshaft provides an easy passage for a large volume of oil, which not only lubricates but cools the bearings. The main oil circulating pipe runs above the crankshaft and is in communication with both the main crankshaft and camshaft bearings. The lower rod bearings are taken care of by oil leads through the crank cheeks. The oil return drains to the pan, where it is thoroughly filtered before being recirculated. There is a drain sump at the bottom of the oil pan for removing the dirt which has been collected by the screen or for draining the system. It is possible to simply drain the sump, or to remove the entire screen by taking out the cap screws holding this in place. The entire oil pan is readily dropped.

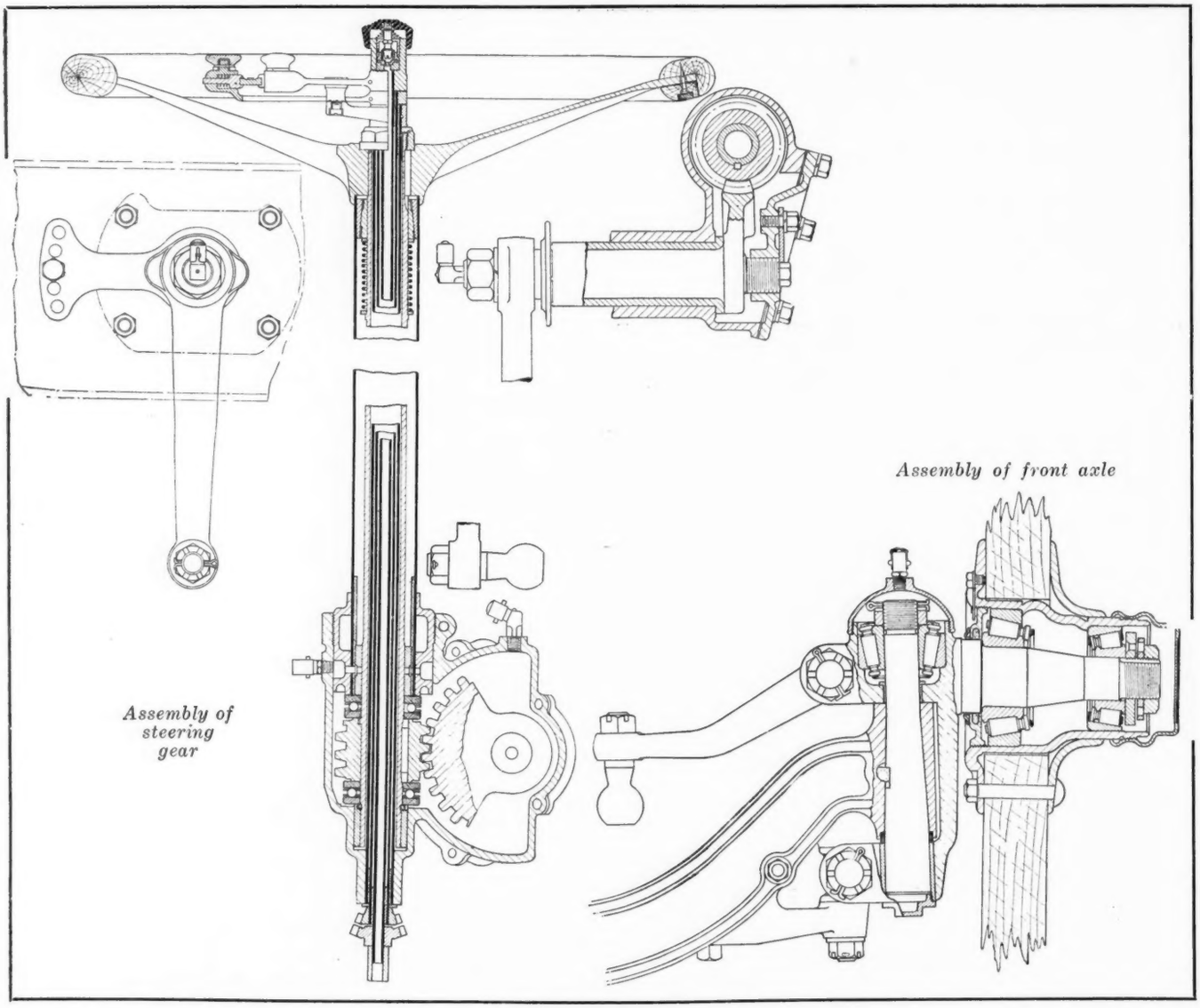
The water system is also noteworthy for its simplicity. The water pump is a dual type, driven directly from the crankshaft without gears or any other auxiliary driving mechanism. This pump has two outlets feeding each block of cylinders independently. It is supported upon the front cover plate of the engine, and the impeller is fastened to an extension of the crankshaft and is driven from it. Because of the fact that the crankshaft is also the pump shaft, and no bearing is required, the design necessitates only two packing glands and eliminates the lubrication problem.

There is a thermostat mounted on the dash, which is in communication by a flexible tube containing fluid, with the tank in the top of the radiator. This fluid operates the thermostat on the dash and by its actuation a pull of 60 lb. is secured. By a system of linkage, this is reduced to 20 lb., which is sufficient to operate the vertical shutters. The entire water system and the thermostat are designed to give a running temperature of 150 deg. to the engine, which is much lower than common practice. The shutters open at 130 deg. and are wide open at 150 deg. It is claimed that by the use of these shutters and thermostatic action very little variation in manifold temperature for winter and summer running is felt.

In working out the manifolding and carburetion sys-



Assem'ly and part sectional view of LaFayette engine



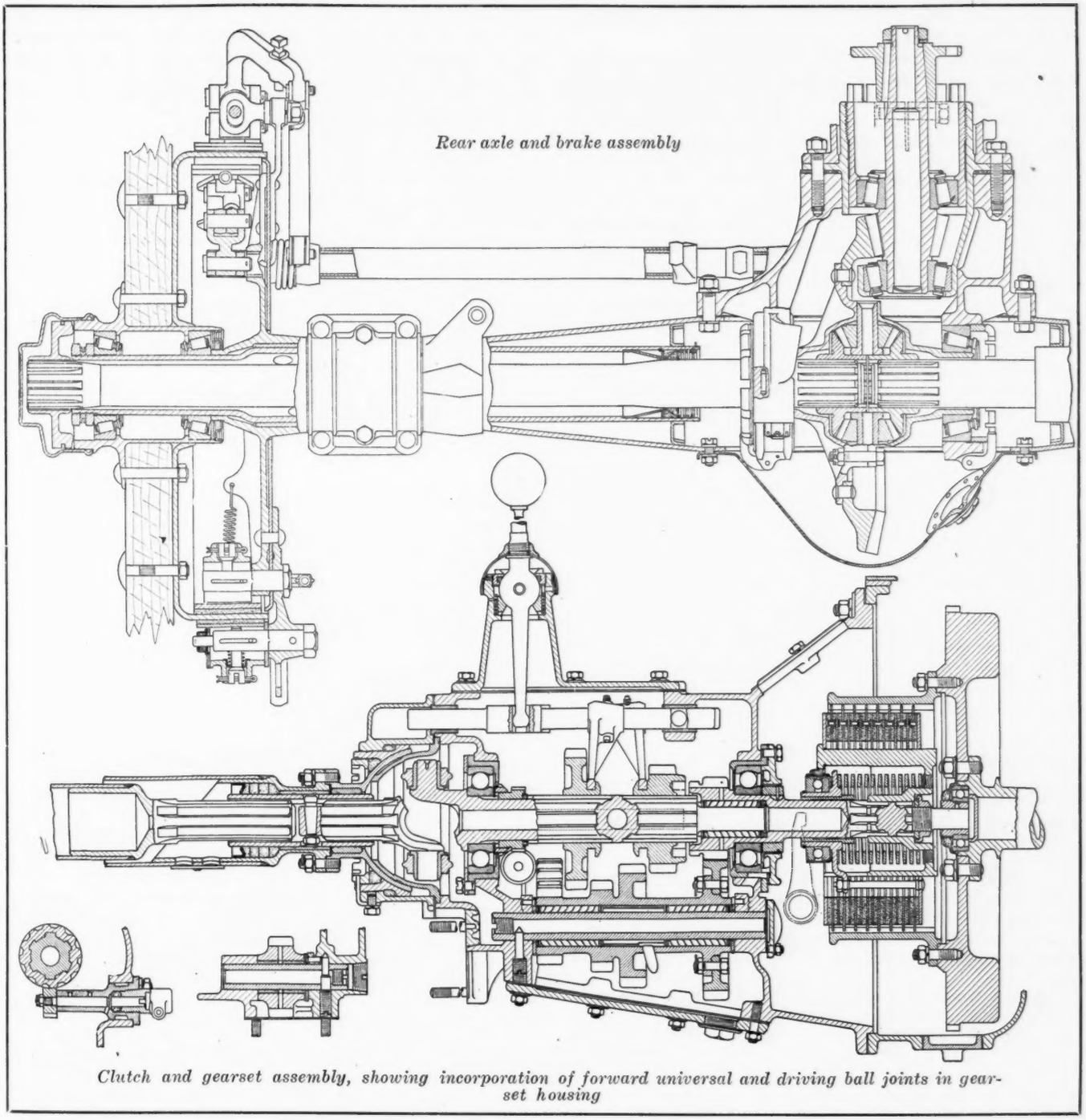
tem, a manifold temperature of 120 deg. was made the objective point, regardless of exterior temperature conditions. The carbureter is mounted in the center of the V, being supported by the intake manifold which forms an arched bridge from one block to the other. This intake manifold is exhaust-heated and the manifolding is so laid out that more exhaust heat is supplied at low speed than at high speed. This is accomplished by taking advantage of the surging action of the exhaust between the two blocks. The speed of the exhaust gases influences the amount of surge passing through the exhaust jacket and as the speed of the exhaust increases the surging action drops, thereby supplying less heat to the fuel at the higher engine speeds.

The intake manifolding is laid out to produce a whirling action of the gases. The engine operates under compression of 80 lb. per sq. in. absolute, and the mean effective pressure on some of the best runs has been nearly 100 lb. per sq. in. The gas speeds vary at different points in the manifold, due to the changes of superficial area caused by changes in the manifold section. The speed of the whirl also varies at different parts of the manifold.

With a powerplant of ample dimensions as far as structural strength is concerned, weighing approximately 7 lb. per hp., it is evident that both the structural features for lightness have been observed, as well as the attainment of an unusual design for power output. The maximum speed of this engine is well up toward 4000 r.p.m., and the power peak on the production engine will probably average around 2800 r.p.m.

The electrical installation is a Delco system which takes care of ignition, starting and lighting. The generator and starting motor are combined in a single unit, the starting pinion being directly above the flywheel, as the motor generator is mounted in the engine V at the rear end. The starting switch and the switch pedal are both mounted on the flywheel housing, giving short connections and wiring at this point. The generator is regulated by the three-brush system and is equipped with a thermostatic cutout. The engagement of the starting motor to the flywheel is through a system of reduction gearing and there is no mesh of these gears except during the starting operation. The reduction is from the starting pinion to a spur gear, thence to a spur pinion and to the flywheel ring gear. The gear, which meshes with the starter pinion, and the pinion which meshes with the flywheel, are both moved into mesh when the starting pedal is depressed.

The clutch is a dry plate type with seventeen steel plates alternately faced with asbestos, and it is mounted in a drum bolted to the rear face of the flywheel. The clutch spring is a single, concentric type, and the clutch shaft is pivoted in the center of the flywheel. The gearset is a



Rear axle and brake assembly

Clutch and gearset assembly, showing incorporation of forward universal and driving ball joints in gearset housing

three-speed, selective type, with the main shaft operating on annular ball bearings and the lay shaft on Hyatt rollers. The speedometer drive is by worm gear off the main transmission shaft. A feature of the transmission gearset assembly is the incorporation of the forward universal joint within the same housing as the gearset. This enables lubrication of this part to be taken care of automatically. The car is driven through a ball joint at the forward end of the torque tube, and this is also enclosed within the transmission gearset so that lubrication of this important thrust bearing is also assured.

The propeller shaft is a tubular unit with a slip joint at its forward end, and is enclosed within the torque tube. The entire unit can be dropped by removing the bolts from the flange at the forward end of the torque tube, sliding back a sleeve and driving out a taper pin, allowing the entire assembly to pivot about the rear spring shackles and drop out of the way for repair purposes.

The use of the tubular construction for the propeller shaft allows extreme lightness in this part of the chassis. This same feature is found throughout the rear axle construction. The use of forgings of light sections but of great strength characterize the rear axle and make it a noteworthy design. There is a Timken roller bearing both in front and behind the spiral bevel pinion, this pinion shaft being mounted in a carrier which is also a drop forging.

The axle shafts are solid, but are housed within light pressed tubing. The differential carrier is aluminum. Both the pinion and ring bearings are adjustable, so that exactly the desired mesh may be maintained between the pinion and ring gears. The axle load is carried on the

housing, this being a full floating type, and the bearings are Timken throughout.

The wheels are wood, of the artillery type, mounted on drop forged and pressed steel hubs. They run on Timken bearings and are fitted with Firestone demountable rims for straight side tires. Both the internal and external brakes are mounted directly on the wheels. A feature of the brake design is a sector equalizer. This was described in AUTOMOTIVE INDUSTRIES, Feb. 5, 1920, on page 399. Briefly, the equalizing is done through a bevel gear and pair of sectors which operate very much in the same manner as the ordinary differential. The front axle is a reversed Elliott type, the entire forging for the axle weighing only 33 lb. It has a deeper drop than most modern axles, and the pivot pins are tapered, with the load taken by a Timken bearing at the top.

The steering gear is a worm and sector type, completely adjustable, with an aluminum housing, giving an extremely light assembly. The frame is pressed steel, deeply braced and stayed and is stiffened against bending and torsional stresses by three cross tubes, combined with a center channel, and longitudinally re-enforced by substantial gusset stays. The fuel tank is mounted in the rear of the chassis, contoured to the chassis frame, and carries 20 gal. The fuel is fed by air pressure to the carbureter. The connecting copper piping is protected by fiber clamping blocks.

The springs are semi-elliptic throughout, the front being 42 x 2¼ in. and the rear 60 x 2½ in. These springs are silico-manganese and are mounted on extra large tubular shackle bolts. Since all of the drive is taken by the torque tube, these springs have only a suspension function. The rear spring shackles are always in tension, which tend to prevent slack and rattle. The tire size is 33 x 5 in., for all body types, with five tires standard. The front tires are ribbed and the rear anti-skid. The spare tire is also anti-skid. Lubrication of the chassis is taken care of by the Alemite system. The prices for the LaFayette car are as follows: Chassis, $4750; touring car, $5625; torpedo, $5625; coupe, $7200; sedan, $7400; limousine, $7500.

Weather Conditions of the Latin American Countries

Argentina: September, October and November are the spring months; following five months weather is chiefly mild; no cold except in extreme south; rainy season during July and August. Rains are heavy.

Bolivia: No cold except in the Highlands and Andes; lower slopes have a rainy season during July, August and September; highlands have cold season at the same time. Remainder of year warm.

Brazil: No intense cold; rainy and cool during the period October to March; remainder of year warm with occasional rains. Nights are cool.

Chile: Winter months are June and July; following months are very warm, resembling California in temperature; heavy rains in south during winter months.

Columbia: January, February, March, July, August and September are dry and warm; heavy rainfall balance of year; Pacific coast is hot with rains during entire year.

Costa Rica: Dry season December to May; the first three months being the coolest of the year; remainder of year mild with slight rainfalls.

Cuba: Heavy rainfall in northeastern section; rainy season January and February; balance of year warm with occasional rains.

Dominican Republic: December to May dry with occasional rainfalls following; chiefly mild weather at all times.

Ecuador: No well defined summer and winter; chiefly warm with occasional rainfalls; lowland between Pacific and the Andes extremely hot.

Guatemala: December and January are the coolest and March and April the hottest; rainy season from May to October; not excessive.

Haiti: June, July and August are summer; remainder of year mild with slight rains.

Honduras: Hot at all times in lowlands; in the highlands chiefly warm; rainy season from May to November.

Mexico: Heavy rainfall from June until December; dry and hot remainder of year.

Nicaragua: Chiefly mild; greatest rainfall on the eastern coast; rainy season May to December; rains not excessive.

Panama: Rainy season from April to December; not heavy; remainder of year hot and dry.

Paraguay: June, July and August are winter months; mild and dry; the rainy season October to February not excessive; remainder of year warm with occasional rains.

Peru: Heavy rainfall and very warm on the eastern slopes; Pacific slope is dry and warm; no well defined rainy seasons.

Salvador: Rainy season from May to October, with heavy rains in July and August; dry and warm remainder of the year.

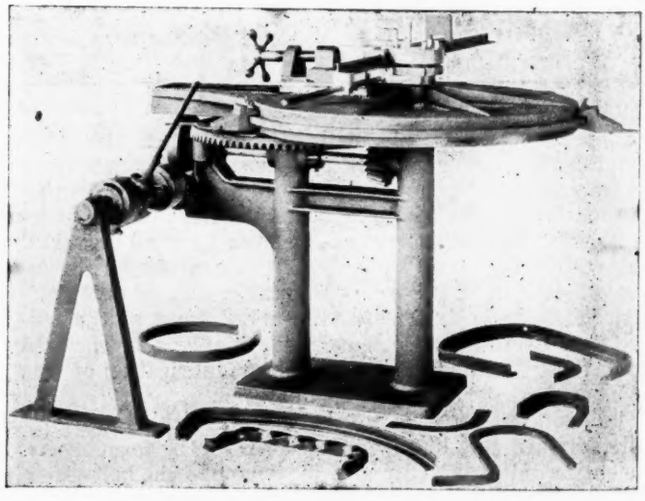
Uruguay: Chiefly mild; heaviest rain in May and October; July and August are subject to cold storms; temperature from 32 to 88 degrees.

Venezuela: Rainy season from April to October; remainder of the year warm; conditions depending on altitude.

Power Machine Handles Angle Sections

A POWER driven bending machine that will handle both pipes and angle iron has been put on the market recently by the Wallace Supplies Manufacturing Co. The machine will handle work up to 50 in. diameter and weighs approximately 1200 lb. The drive is by belt and flat pulley.

The form is machined to take the shape of the piece to be bent and is made to specifications. Instead of having the roller press on the piece a machined bar, called the follower bar, is interposed. The device prevents the hollow caused by the roller in other models being formed. Adjustable stops are provided which release the clutch when the bend is completed and throw in the reverse, which is again released when the starting point is reached. The roller bracket is set by a screw which allows sufficient pressure to be obtained against the piece to be bent.



Wallace power-driven bending machine

English Design and Operation of the Motor Bus

Part III

The body of the "K" type is described in this article in great detail. This body marks a great advance over previous designs in many ways. The London police regulations limit the unladen weight and this has had a marked effect on the design. The passengers' comfort is much improved.

By M. W. Bourdon*

THE problem put before the designers of the new "K" type London bus was by no means easily solved; with very definite limitations imposed by the licensing authorities as to unladen weight, wheelbase, overall length and width, ground clearance, minimum headroom inside, minimum seat width per passenger, etc., they were asked to provide seating accommodation for 12 more passengers than were able to find room in the preceding ("B") type. How well they succeeded will be realized when it is said that they have complied with these essentials and have actually provided a complete vehicle weighing unladen slightly less than the 34 seated bus.

The problem included lightening the body as well as the chassis. With its 12 extra seats the new superstructure weighs approximately 240 lb. less than the old. This has entailed a completely new design of chassis and bodywork, and, as explained in a previous article dealing with the chassis, the greater floor space required by the 46 seats as compared with 34 has been secured by moving the driver's seat forward, so that he is now positioned almost alongside the engine on the right-hand side and somewhat higher than usual. Besides additional seats a larger loading platform is given and a staircase more conveniently curved and with treads 2 in. wider—18 in. as against 16 in. The larger platform allows the inside and outside passengers to be separated when entering or leaving the bus by a pillar at the center of the top step, thus avoiding a great deal of the confusion and loss of time which previously occurred in taking up and setting down.

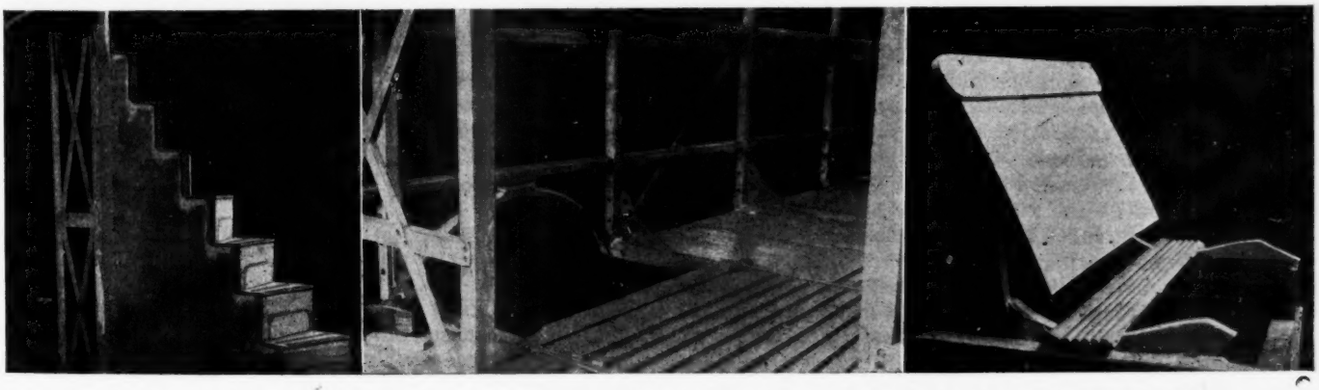
In spite of the criticisms of the design put forward when it was first announced, both chassis and body have proved their durability and strength in service, for the earliest examples put on the roads have now been running some eight or nine months, covering over 30,000 miles on some of the roughest and most trying routes. Speaking generally, it may be said that the successful design of the bus as a whole is the result of efficient co-operation between chassis builders and body makers. The body can hardly be considered as entirely a coachbuilding job; it is a combination of coachbuilding and engineering.

Previous efforts to lighten bus bodies were confined to cutting down their heavily constructed forerunners in order to eliminate unnecessary weight. This method did not prove satisfactory, nor go far enough in the desired direction.

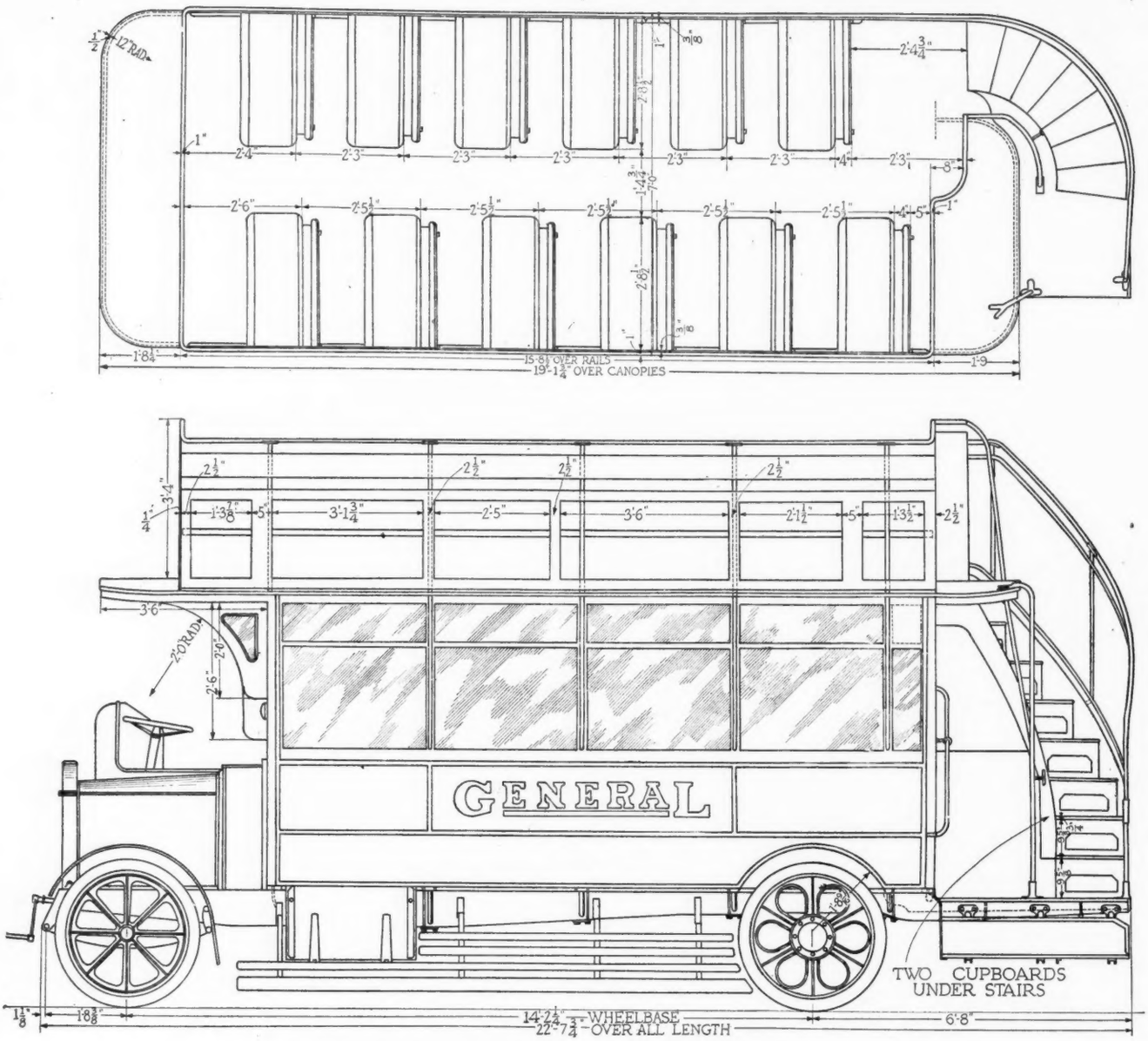
In the new body the main variations in principle of construction were (1) the utilization of the longitudinal strength of the chassis frame as a base for the body—instead of making the superstructure self-contained in this respect and (2) the adoption of the flitch plate system in the framework, floor, roof and seats.

As regards (1), previous bodies were built so that they were rigid enough in themselves and did not depend upon the frame of the chassis at all for their strength and rigidity, which, of course, necessitated a heavy construction. The new body, when apart from the chassis, has

*Mr. Bourdon is engineering correspondent of AUTOMOTIVE INDUSTRIES in the United Kingdom.



At the left—A stairway in the course of construction showing the wooden jig on which it is erected. Center—The wheel arch in the floor of the body partially completed, showing how the gusset plates fit into the flitch plated side members, and the bolts holding them rigidly in position. At the right—One of the outside seats of the bus in course of construction



K type bus body. Roof seating plan and side elevation

very little strength in a horizontal direction, and during the course of construction it is always supported by a stout framework which is practically a model of the chassis frame—a jig, in fact.

In the old models the rear platform and step were supported by the body itself, being a part of it, and this necessitated the use of strong and heavy irons at the rear to resist the leverage exerted by passengers standing on the step, platform and staircase; the "K" type chassis on one side has been extended to give direct support to the platform, and the leverage having thus been removed from the rear portion of the body, the side pillars and cross bars could be made much lighter and the irons eliminated.

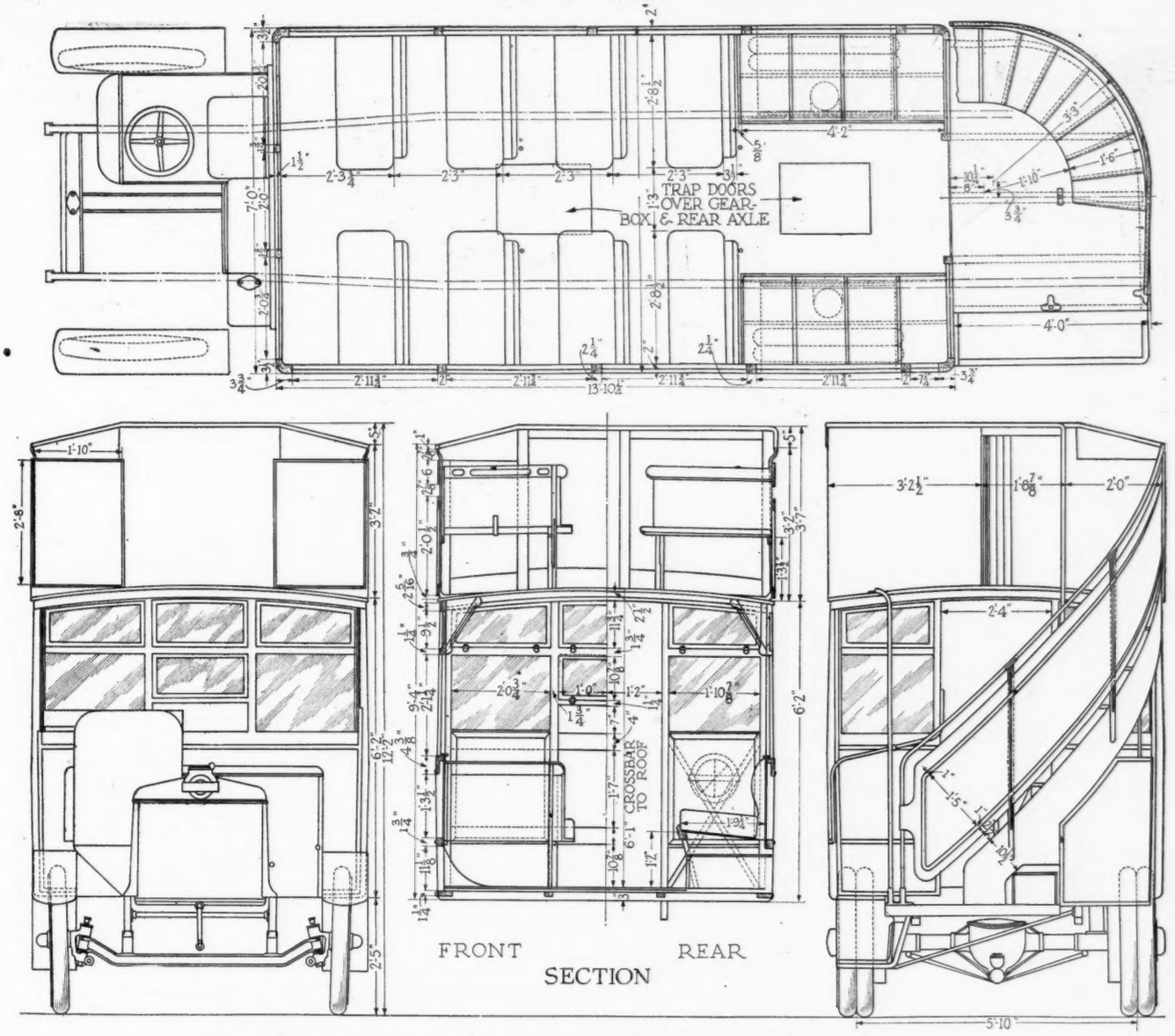
Instead of endeavoring to reduce the weight of a heavy body, the designers have made the framework very light and have then strengthened the various components where necessary, a method enabling the stresses to be equalized and counteracted where they occur. Jigs are employed extensively in production, the staircase, seats and roof being among the items thus assembled apart from their ultimate connections and supports.

Transversely the body exterior is practically surrounded by bands of steel; all the pillars—side, front and back—are grooved throughout their length and have inserts of 16 S. W. G. mild steel; the crossbars of the floor are similarly treated and also the hoop sticks of the roof. At each corner, where the pillars, crossbars and hoop sticks unite, drilled gusset plates of 14 gage are fitted, these plates connecting the steel inserts. The steel members and the wood are held together by coachbolts, which pass through holes drilled in the steel.

The roof is additionally supported by four tubular brass pillars. The rearmost pair of these rest upon crossbars, the other pair being bolted to the floor, with blocks between the floor and the chassis frame to take the downward thrust. These pillars are also attached to the backs of four of the seats, providing an additional stiffening effect and reducing vibration.

The upper gusset plates are concealed by wooden casings having three-ply sides and serving to carry the electric lamps and conceal the wiring. The bottom gussets are almost hidden from view by the seats.

The body sides are now straight from top to bottom and spaced to provide the full width allowable, instead of being



K type bus body. Inside seating plan, front sectional and rear elevations

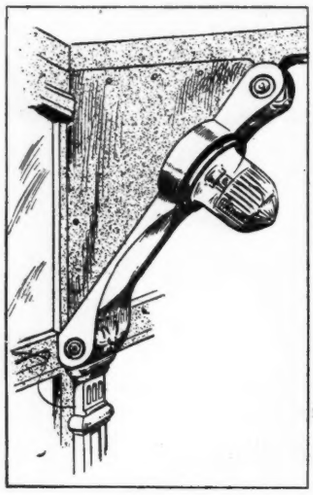
reduced in width under the old longitudinal interior seats. With the transverse seats now provided in the fore part of the interior, the old arrangement could not be followed; the new straight sides obviously necessitate wheel arches for the rear wheels and these are concealed by the short longitudinal seats. The arches themselves are formed of sheet steel and serve by their construction to add a modicum of rigidity to the body as a whole.

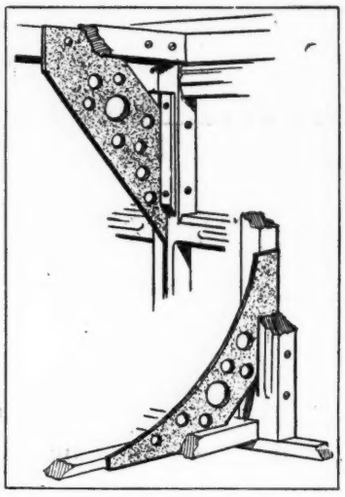
A further and not unimportant variation in outline is the "tubbing" of the roof. Although this longitudinal curvature is slight, only 1 in. in the whole length, it has been found to increase the strength appreciably. The 3-in. compass allowed on the width is the same as before, but there is now no overhang at the sides as hitherto. "Tubbing" it will be realized makes the shape of the roof similar to that of the staves of a barrel, though, as mentioned, the curvature in one direction is very slight and not observable to the eye.

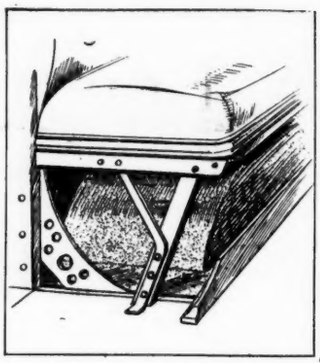
The four corner pillars are formed of 3¼ x 3¼-in. ash, the exterior angle being rounded off and the interior deeply grooved. Two of the side pillars are of 2-in. square section ash, with two more between them 2¼ x 2¼-in. Longitudinal members vary in sectional dimensions, the stoutest being one on each side of 1¾-in. square section level with the seats. The floor crossbars are 3 x 3-in. in section.

Practically all panels are of three-ply waterproofed birch, 5 mm. (say 3/16 in.) thickness in all. The interior floor is also of this material, but has wearing slats fitted along the gangway and between the seats. The roof of the interior—the floor of the upper deck—is formed of two thicknesses of three-ply board with waterproofed khaki duck between them. Wearing slats are fitted outside also, but in this case each unit is made up as a separate and detachable mat; the slats are screwed to steel crossbars, the latter being screwed to the flooring. Incidentally it may be mentioned that this method of construction reduces the number of screws used from 360 to 36, for previously each slat was screwed on independently; besides taking more screws, it was found that the latter had a tendency to work loose and allow water leaks to occur into the interior of the body.

The old style, half round, forged steel side rail stanchions of the exterior have been replaced by stanchions of angle steel with welded-on T pieces to carry the aluminum side rails. At the bottom corners the stanchions are strengthened by angle pieces welded on, and on the exterior a small welded-on bracket is provided to carry







At the left—Bracket carrying interior lamp. Three-ply side panels conceal gusset and electric light wiring. A gusset plate uniting steel inserts in side pillar and hoopstick. Above—Interior longitudinal seat, end view, showing gusset between side pillar and floor crossbar, also arch under seat for rear wheel. Part sectional view of one of the outside seats, a leg being broken away to show steel insert

the wooden side boards, the latter supporting the outer ends of the transverse seats.

The staircase is far more commodious than the old type; it has a wide sweep and is less abrupt. As mentioned already, it is built up on a jig, curved steel side plates being fitted to hold together the wooden steps, which have metal toe plates and treads. The unit weighs 36 lb. less than the old pattern and has no projections likely to catch the clothing of passengers. The rail stanchions are of T section steel and the stringers of L section; in both cases the shorter ribs are turned outward so that the three-ply advertisement boards (which serve as "decency screens") fit neatly into them, forming a perfectly flat surface and assisting to prevent vibration. Throughout the whole of the body, stamped or angle steel is used instead of forgings; no iron whatever is used.

The rear platform framework is of ash, the edge and center being strengthened by elm battens and covered with ¾-in. thick spruce boards screwed to the frame.

The exterior seats are very light (9¾ lb. each), the legs of the transverse units being strengthened by the fitting of steel plate inserts; narrow battens form the seats, and three-ply wood the backs. Weighing only 19¾ lb. each with upholstery, the interior transverse seats are similarly constructed as to the frames. The upholstery has springs of the hour-glass type held together by clips and edged with fine rope; on top of the springs is a covering of light cocoanut matting, then a layer of felt, next a covering of Hessian cloth, and finally the outside plush.

In accordance with the regulations of the licensing authorities, ample space is allowed for the gangways, these being 15 in. inside and 16¾ in. outside. The regulations also specify that each passenger is allowed at least 16 in. of seat width; complying with this, the transverse seats, each for two persons, are 32½ in. wide.

Of minor details the following may be mentioned: Owing to the absence of roof overhang, side ventilators for the interior have been omitted, as water would have dripped through them. In their place, four ventilators are now provided at the front and two at the rear, allowing a continuous current of air to pass along under the roof. The wiring for the interior lamps is carried along the length of the bus in a recess in each cant rail and is concealed by moldings. The bodies are finished in three colors, the paint and varnish being hand applied with brushes, spray painting and other time-saving methods having been tried and discarded.

House Lighting Sets in Britain

RECENTLY there has been a notable attempt in England to create interest in the neat and compact little American house lighting sets. Much advertising space in the daily and weekly business press is being used for this purpose and good displays are made at the shows. Apparently, the effort is being rewarded with business, doubtless due to good reports of users and the attractive and compact appearance of these sets. Probably it is due in part also to the now excessive charge for electricity from public service mains. A rate of even 16 and 18 cents a unit is being paid in the London area for house lighting current, when formerly the charge was as low as 7 and 8 cents the unit. Consequently, these small sets can generate cheaper and, being reasonably fool-proof, cost hardly anything for attendance. Moreover, the accumulators are better suited to the intermittent service conditions of this sort of plant than was the case until recently with the British accumulators, which also were not obtainable in the small compact sizes required.

Those interested in the sale of these imported electrical sets must not lose sight of the fact that there is also a market for larger sets embodying the same features of compactness and moderate price in the larger sphere for country house lighting sets. Hitherto, this plant has been of the sort requiring more or less constant supervision and is costly at the outset. The engines are comparatively slow running, with the generators correspondingly large, and often require special foundations and a large area of isolated space. With metal filament lamps, and the more recent half-watt nitrogen-filled lamp, the same effulgence is obtainable from plants of about half or even a third of the rated capacity of the older plants. About 5 hp. seems to be enough for the average modern private house lighting set.

The Rolls-Royce Aircraft Engines Described and Illustrated

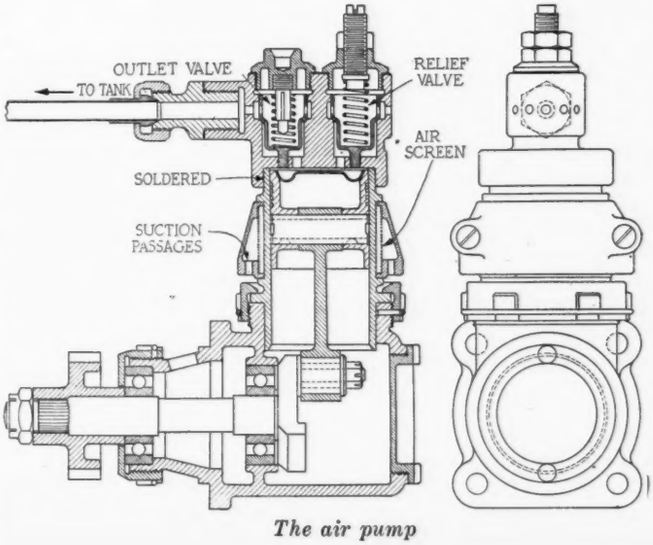
Part IV

This final portion describes the fuel supply system and the distinctive epicyclic reduction gear. This gear is very compact and has the advantage of not changing the position of the propeller hub. The table appended gives the calculated stresses in the gears as well as other useful data.

FOR the fuel feed there is provided an air pump which is driven from the second magneto drive shaft in the rear part of the housing by means of helical gears. In earlier designs this air pump was located —the same as in many German engines with overhead camshafts—at the front of the valve housing, where in the case of "headers" it was always exposed to damage. This air pump is provided with inlet openings near the lower end of the stroke, while a delivery valve and a relief valve are arranged in the cylinder head. It is rather remarkable that even the air pump crankshaft is provided with counterweights, which precaution was undoubtedly taken in view of the high speed of the pump.

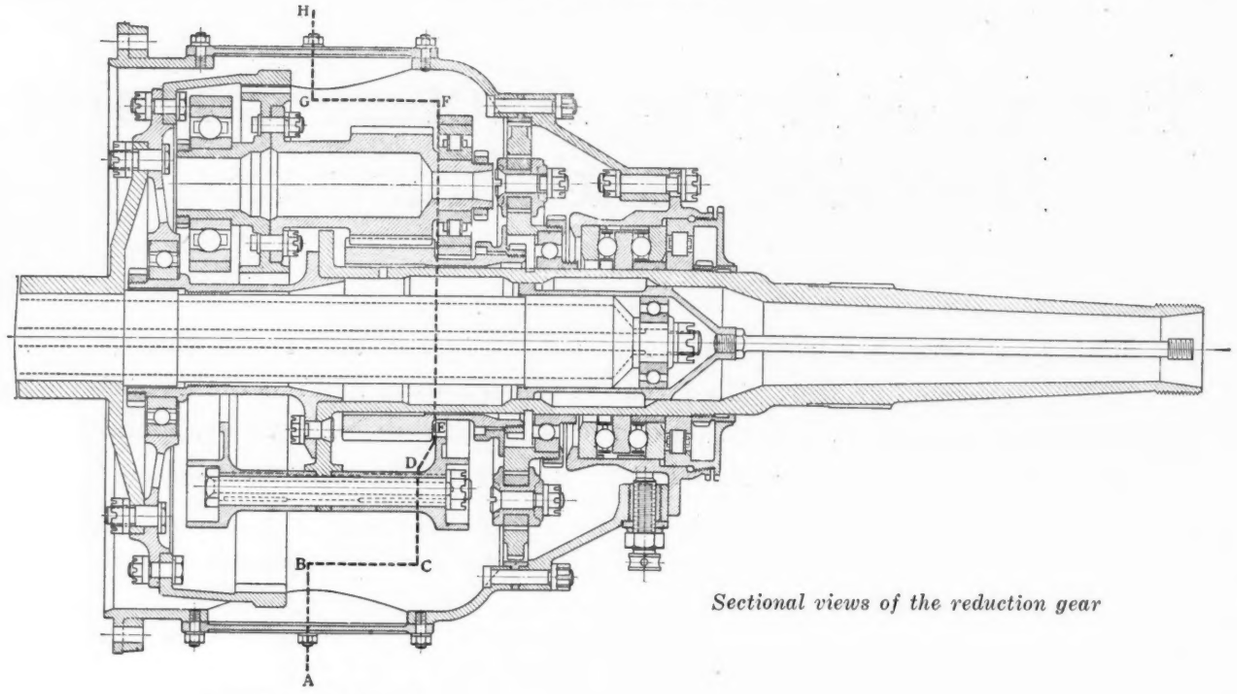
The dimensions have been chosen very liberally, so that even in the case of a very steep glide and large tank dimensions there is still sufficient pressure even if the tank is almost empty. In earlier designs this requirement was in most cases not sufficiently considered. However, fuel feed by air pressure in aircraft must be regarded as an obsolete practice, as in a modern war plane, in order to insure bullet-proofness and fire-proofness, the fuel tanks must not be under air pressure. In this case the air pump must be replaced by a fuel pump, the design of which involves difficulties in relation to the packing, while, on the other hand, at high altitudes (above 22,000 ft.) the suction of fuel pumps driven from the engine may decrease.

Allied designers, therefore, resorted to the use of a pump located directly in the fuel tank, driven by means of a worm and wheel, a solution of the problem which cannot be regarded as ideal in every respect, as there must be a separate pump for each tank, and, besides, the worm drive may interfere with the freedom of movement of the observer. Such a fuel tank is the one of the French accessory manufacturing concern Astra. It is an eccentric or vane pump and is secured in the tank on the one hand by a stud, and on the other hand by the tube and the screw fastenings. The tube projects from the tank and carries the housing in which there is a bevel gear drive, which is driven through a wooden driving screw. Fuel rises through the tube. Any surplus is returned through the relief valve to the tank. The pump housing and the eccentric are made of cast brass, the slide or vane is of vulcanized fiber, the upper bearing of compressed paper and the lower bearing of fiber. As the pump is located in the tank, any leakage does no harm. The pump is sufficiently protected against cutting by the character of the materials used for the different parts, which are completely submerged in gasoline.

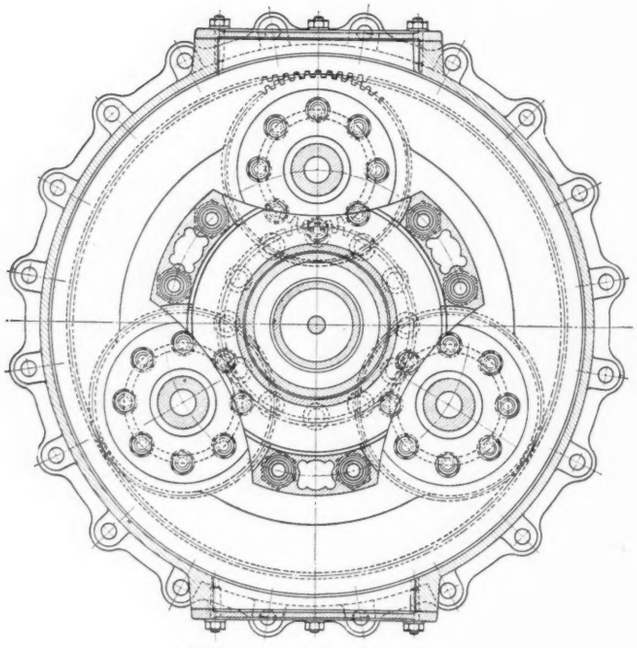


The air pump

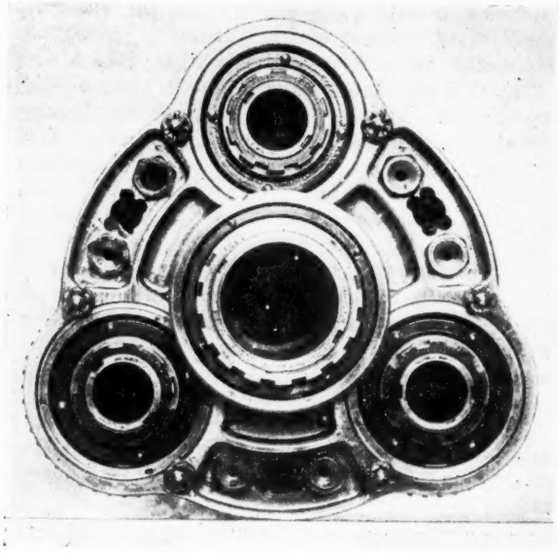
One of the most interesting parts of the engine is the reduction gear. It is a planetary gear in which the propeller shaft is concentric with the engine crankshaft. Although from the standpoint of the airplane designer this is a disadvantage because a high fuselage, and, therefore, a high airplane results, this construction offers many advantages to the engine designer, which advantages will be outlined in the following. In the first place the form of the gear housing, which is a body of revolution, is well suited for withstanding the forces impressed upon it, and this, in conjunction with the use of ball bearings, insures the correct relative positions of the different gears. It is true that the use of ball bearings in the reduction gear, in combination with plain bearings in the crankcase, involves the disadvantage that in case of a taking up of the crankshaft bearings the bearings of the reduction gear must also be adjusted. This difficulty can be obviated by providing the shaft with a Hookham joint or else make the reduction gear housing movable relative to the crankcase by means of a cross joint. The last mentioned plan has been adapted in the case of the Rolls-Royce engine. Here the cross joint lies between the housing and the wheel of the planetary set supported in the housing, so that the shaft may assume any desired position inside the gear case without disturbing the co-axial relation between the reduction gear and the crankshaft. The design of this cross joint may be studied in the sectional views. The only things to be adjusted relative to the reduction gear housing are the double thrust bearing and the forward roller bearing for the propeller spindle, which are located in a common housing. This adjustment is effected by means of four substantial



Sectional views of the reduction gear



SECTION A-B-C-D-E-F-G-H



The spider

setscrews in the reduction gear case. As this bearing automatically adjusts itself when the engine is turned over after the fastening and setscrews have been loosened, the adjustment involves no great difficulty.

Another advantage of the Rolls-Royce reduction gear resides in the low tooth loads, both as regards bending strains and frictional losses. The former are measured by the expression P_u/bt, that is, tangential pressure divided by face width and circular pitch; the latter by the product of tangential pressure and sum of speeds of revolution of the meshing wheels, divided by face width and number of teeth. Both loadings are relatively low compared with the ordinary two-shaft reduction gears used on aircraft engines, which is due to the division of the load between 3 pinions. As a third means of judging the strains on the gears we have the tooth flank pressures. It is excessive tooth pressure which in many cases results in destruction of the tooth flanks and therefore in failure of the gear. This load depends upon the radius of curvature of the tooth flanks at the point of contact. The greater this radius the lower the strain. In this connection the internal type of gear is of special advantage. In the accompanying table, the different loads are given for the different forms of the Rolls-Royce gear.

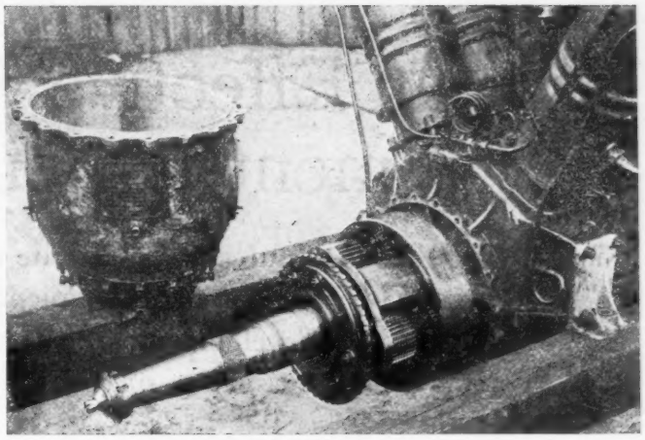
As another and not the least advantage we have the fact that it is possible to use small gears and fine pitches, so that favorable conditions of mesh and exceedingly accurate production of the gears are assured.

Finally, the planetary gear permits of placing considerable and effective gyratory masses in the internal gear. The only disadvantage to the engine designer is the relatively high weight, as the impossibility of hardening the internal gear is of no consequence, in view of the exceedingly low tooth pressures, only about one-third the pres-

TABLE III

Rolls Royce Gears (Planetary)

Type Motor	190 hp.	250 hp.	275 hp.
Effective b. hp.	200	260	300
n Crankshaft/n Propeller	1700/1002	1600/1024	1650/990
Z_1/Z_{2a}	120/45	120/45	120/45
Z_{2b}/Z_1	21/39	30/45	27/48
$b_1\ 2_a/b_{2b4}$ in.	0.951/1.75	0.984/1.77	0.984/1.77
d_1/d_{2a} in.	9.5/3.55	10/375	10/3.75
d_{2b}/d_4 in.	2.125/3.84	2.5/3.75	2.25/4.0
$e=d_3/2$ in.	2.95	3.125	3.125
$dp=d_{2a}/Z_{2a}$ in.	0.079	0.8834	0.0834
$dp=d_{2b}/Z_{2b}$ in.	0.1012	0.0834	0.0834
n_1 (v_u ft./min.)	1700 (4,211)	1600 (4191)	1650 (4310)
n_2	2862	2560	2750
n_3	1002	1024	990
n_4	0	0	0
Relative n_1-n_2	1162	960	1100
n_2-n_4	2862	1024	990
r. p. m. n_2-n_3	1860	1536	1760
Md_1/Md_3 in. lb.	3320/31,530	4568/40,150	5120/48,000
P_u 1, 2a/P_u 2b, 4 lb.	1547/2652	2018/3028	2268/3763
Pu 1, 2z/3b and Pu 2b, 4/3b lb./in.	215/35.62	269/40.17	301/49.75
Pu lb, 2a/3b. t/2 and Pu 2b, 4/3b. t/2 = k. lb/sq. in	684/35.4	810/47.5	907/59.0
Vu rel. 1, 2a/Vu rel. 2b, 4 ft., min.	1726/1005	1497/1004	1726/1035
Pu. Vu. (1, 2a)/b.z = w(1)	23,560	25,740	33,010
Pu. Vu. (1, 2a)/b.3z = w(2a)	20,930	22,890	29,380
Pu. Vu. (2b, 4P)/b.3z = w(2b)	24,600	19,050	27,400
Pu. Vu. (2b, 4)/b.z = w(4)	39,400	38,200	45,900
Weight without Thrust and carrying bearings, propeller spindle, and housing	57.3	64.35	66.8



View of the gear with cover removed

Notation:

Z = No. of teeth

b = Width of teeth

d = Pitch diameter

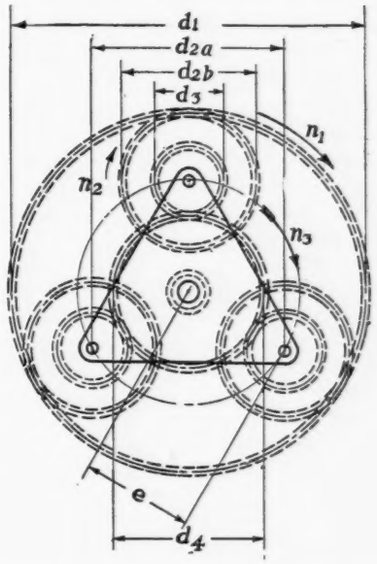
dp = Diametral pitch

n = R.p.m.

Md = Torque

Pu = Pitch line pressure

Vu = Pitch line velocity



sures used with hardened gears. As the generation of heat in the gear is not very intense, there is no need for a specially good lubrication system. Lubrication is effected through the hollow crankshaft. In addition there is an extra oil line branched off from the camshaft oil-line, which supplies a limited amount of oil to the gears from the outside. The oil thrown off by the gears returns to the crankcase, whence it is returned to the oil tank by the oil return pump.

British Oppose Empire Trade Mark

BEFORE the war, an agitation in Great Britain against the increasing import of foreign goods to the detriment of home made lines resulted in an Act of Parliament compelling all imported goods to be branded with the country of origin. It was hoped by the outcome of this movement that the public, when confronted with a plain declaration that such goods were not of British origin, would prefer to have them British made. But the effect was the opposite and, so far from retarding the sale of the imported branded lines, it has merely disclosed to many buyers, hitherto unaware of and not interested in knowing the country of their origin, that they were specifically not British, and their sale increased.

In part, as the war's result, the Board of Trade recently appointed a state committee to review the subject and to consider the advisability of setting up a British Empire trade mark. The proposal had about it the fatal objection that the granting of such trade marks would be under the control of a private association.

As regards notifying indications of origin, the committee states that while it cannot recommend that all imported goods shall bear an indication of the country of origin, it recommends the special marking of imported goods in certain trades where British goods are deliberately imitated. The committee recommends also that the existing Act should be amended to include in the broadest possible manner all indications, descriptions, or statements, oral or documentary, whether physically attached to the goods or not, including statements in advertisements or catalogs and false indications given by trade names or titles of firms or companies, which are reasonably calculated to lead a purchaser to a false belief as to the origin of the goods.

The committee, in the absence of agreement among the bulk of the traders concerned, sees grave objections to the institution of a British national or Empire mark, particularly one which is to be under the control and administration of a private association.

How an Effective Employment Department Is Being Developed

Large expenditures and elaborate equipment are not essential to the successful operation of an employment department. Intelligent vision and progressive development are of more importance. Practical means of operation now being successfully used are described in this article.

By Norman G. Shidle

AN intelligent vision for future development and an effective system of operation under present conditions are the chief features of employment management at the automobile plant which has for many months had the lowest turnover of any similar plant—with one exception—in the city of Detroit. The methods of this particular department are of interest because they are simple as well as correct in principle; because they can be applied effectively anywhere at a minimum of expense and reorganization; and because they have reduced labor turnover about 12 per cent a month as compared with the three years prior to their installation.

There is a tendency in some plants to discount the importance of discussion and work along these lines at the present time, because labor is more plentiful and production per man seems to be increasing slightly of its own accord. Such a condition presents a new opportunity to the employment manager, however, and offers him a chance to accomplish constructive work that he has not had time for in the past, according to C. M. Dotterrer, Supervisor of Employment, Paige-Detroit Motor Car Co., who is in charge of the work described here.

"It has been necessary during the last three years," Mr. Dotterrer said, "for automobile firms to hire almost anybody and everybody that applied for work. Some attempts at selection and placement have been made, but have been greatly handicapped by the pressing need for immediate production. The present condition of the labor market offers to the employment manager an unusual opportunity to build up a strong force, select and place men in a discriminating manner, and start the growth of a real spirit of goodwill and co-operation between management and men.

"In the plant where this opportunity is seized, an immediate, as well as an ultimate, benefit will accrue to the organization. Whether production is at its height or whether it is curtailed temporarily, there is the same necessity for high production per man. By careful selection and intelligent placement of men, the employment manager can contribute in a large way to any curtailment plans the management may find necessary; his study of the human elements, especially as they enter into high per man production, is more necessary than ever. It is obvious that if one good man can be selected and placed where he does the work of two poor ones, any given amount of production will be obtained with less men and consequently at less expense.

"Then in a broader sense, the firms which take this opportunity to play more than fair with their workmen, when the economic situation is such that they might 'get away with things' by virtue of their power in dominating the situation—will later find themselves well equipped with the loyalty and enthusiasm of their entire force if the pendulum swings back again. This is, very definitely, not the time to emulate the domineering ways exhibited by some workmen during the last four years; by so doing manufacturers would show themselves of no more intelligence than those whom they opposed. The time is ripe for building up a spirit of fairness which has been evident only too little in the past."

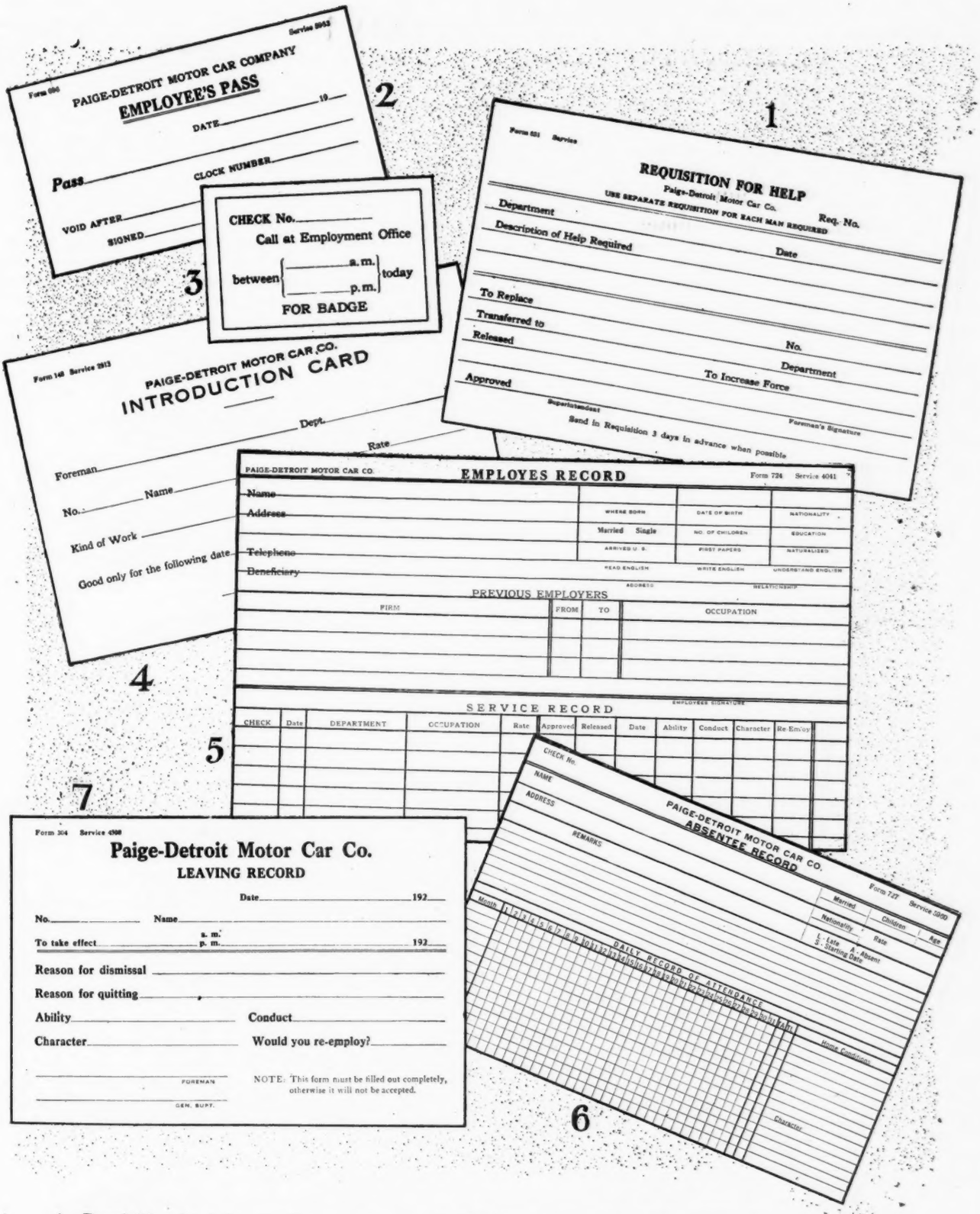
This opinion is interesting as coming from a practical man and as bearing upon the methods used by the department of which he is in charge. In discussing these methods in detail, it will make for clearness to follow through some of the most important forms used in carrying out the work. The functions of the Paige employment department comprise, in a general way, six main factors.

The first is that of hiring men. When men are needed, a "Requisition for Help," Fig. 1, is filled out by the foreman and approved by the superintendent. This form provides space for a brief description of the job, and also for a notation concerning the man who is to be replaced. In this way the employment department records are kept accurate and up-to-date.

When the requisition for help has been received, the prospective employee is interviewed by an employment interviewer who has made a careful study of all the jobs in the factory for which he is expected to hire men. No method of written job analysis has been tried at this plant, but great care is exercised in having the employment interviewer thoroughly familiar with the jobs for which he is hiring. In performing his function, he takes into consideration the fitness of the man for the particular job, as well as the experience which the applicant has already had. It is believed that careful methods of hiring and placing men where they will be able to develop to the maximum of their ability, have had more to do with reducing turnover here than any other single factor.

When the man's fitness for a particular job has finally been determined, he is given a temporary "Employee's Pass," Fig. 2. This pass is carried by the new employee for three days. At the end of this time a slip similar to the one shown in Fig. 3 is placed on his clock card. This slip notifies him that he is to call at the employment office to receive his permanent badge. The use of this temporary pass serves a double purpose. It gives time for the employee to be properly enrolled, etc., before a permanent number is given him, but it also brings him back to the employment office about three days after he has started to work.

At the time he comes back to get his badge, he is interviewed by the employment manager or his assistant with



1—Requisition for help. 2—Temporary pass. 3—Notification to call at employment office for badge. This is also used to ask the man to call for any other purpose; then the word "Badge" is crossed out and the suitable word substituted. 4—Card which introduces new workman to foreman. 5—Employee's record card. 6—Employee's absence record card. 7—Leaving record card, filled out by foreman when employee quits or is discharged

a view to learning how he likes his job, what progress he is making, whether or not he is getting on all right in general. If a man is already dissatisfied, his reasons for dissatisfaction are determined, and perhaps he is transferred to another department where he will be able to render better and more efficient service. Or some adjustment may be made with the foreman of the department in which the new man is already located that will make for better work. In any case, the new employee is followed up and watched carefully during his probation period. It is then that many good men are likely to be lost to the organization; and it is then that poor men should be eliminated, since their continuance means lost money for the company.

When the man has been interviewed and provided with a temporary pass, he is given an introduction card to the foreman of his department. This card is shown in Fig. 4. With this card he presents himself to the foreman.

The most important record used is the "Employees' Record," illustrated in Fig. 5. This is partly filled out when the man is hired. On the upper portion is recorded the usual information relating the name, address, etc., that is required of employees everywhere. Following that is the employee's service record with the company. This contains data concerning every phase of the employee's activity while with the company, including the departments in which he has worked, his original and subsequent rates of pay, and finally the date on which he leaves the employ of the firm, with additional information tending to determine whether or not he should be re-hired, should he apply for employment again later. By glancing at this card, the employment manager can ascertain at any time the progress a man is making, the length of time he has spent on a certain job, etc. This information is used in determining increases in pay and other advances which the employee may desire.

Wage increases at this plant are made by the foremen, but must be O. K.'d by the supervisor of employment before going into effect. In this way, the employment manager is permitted to influence one very potent factor in human relations—the amount paid for the work done. When a man is employed, he is given to understand that the employment department is for him a court of appeal on all matters in which he has a grievance. The men in the plant know that when they feel they have been unjustly treated in the matter of advances in rate they need only go to the supervisor of employment and obtain a full hearing of their case. Often, it is discovered that the foreman has already given the man full justice and that no further increase is justified. In such cases every effort is made to show the man the reasons for not granting his request. Sometimes, however, the foreman is found to have been remiss, and the employment department is able to bring a deserving case to his attention. Then after conference between the foreman and the supervisor of employment, the increase is made. This power of influencing rates is considered very important in making for effectiveness in the work of the employment department. A close co-operation with the time study and rate-setting department has also been found both necessary and beneficial in connection with those departments which are on piece work. Most of the work in the Paige plant, however, is on a day-rate basis.

Another phase of the work which is equally important in peak-production or curtailment times is that of reducing absenteeism. The financial loss to the concern in the way of interrupted production, increased overhead for idle machines, etc., is too well known to bear repeating. Strenuous efforts are being made to combat this evil in a systematic way. A record of every man's absenteeism is kept on an "Absentee Record," shown in Fig. 6. The form is simple and self-explanatory. The results recorded on it allow the employment department to check up on those men who are habitually absent or tardy and if necessary have an interview with them. These records also count in determining raises in pay, promotion, etc.

In a further effort to get men to notify the employment department of intended absences, the following letter is sent to absentees:

DEAR SIR:

Our records show that you are absent to-day without being properly excused.

What does it cost you to lose a day's time? Each day off means that 4 to 5 per cent of your month's wages are lost.

We are keeping an attendance record of each one of our employees and intend to use this as a check when granting promotions or increases in wages. When it is necessary for you to be absent, please notify the Employment Department a day in advance, when possible, and we will get word to your foreman; or if you cannot tell us in advance that you are to be absent, but will telephone us, you will be taken care of in the same way. Whenever you give us this information your job will be held until you return, and your absence will be excused and not counted against your record.

Whenever you think of losing time, figure what the loss of the day's wages will mean to you and try to make some other arrangement. When you have any business transaction that we can take care of for you, we will be very glad to give you our assistance in order to save you lost time. This office is at your service at all times. Very truly yours,

PAIGE-DETROIT MOTOR CAR CO.

.....

Supervisor of Employment.

The final function of the employment department is that of interviewing men who are leaving the plant. At this time a "Leaving Record," Fig. 7, is filled out by the foreman. The employment department transfers the information from this leaving record to its permanent employees' record. Both forms are kept on file, however, in case a foreman should at some later date be uncertain as to what he himself has written.

Every effort is made in the final interview to determine the real reason for which the man is leaving, and records are compiled from the results of these interviews. Thus if a number of men are found to be leaving because of some unfavorable condition, present in the plant, that condition is investigated with a view to finding out what the trouble is and eliminating it if possible.

It is, moreover, possible to determine whether or not it would be desirable to re-employ the man. This factor is especially important at the present time, when some plants are reducing their working forces below normal. No one expects that condition to persist indefinitely and these forces will later have to be built up again. Where former employees can be brought back, much money will be saved in the way of breaking in new men. For the same reason, it is more important than ever that each man be sent away with a pleasant regard for the company.

In connection with this effective system of handling employment and personnel work, a fundamental practice of thorough-going honesty is maintained in all dealings with the men. Through constant contact and experience they have come to learn that a square deal awaits them at the hands of the employment department. Such a foundation is, of course, essential to work of this kind. It operates in two ways. It gives the right-minded workman confidence in the company for which he works and soon shows the

wrong-minded worker that it is useless to waste time dragging unfair requests and complaints to that department: for a square deal does not mean pampering men; it operates both ways, for the man and for the company. With this fundamental, then, the employment department at Paige-Detroit factory has succeeded within a year in accomplishing excellent results.

The department has been under its present system and management less than fifteen months and is, consequently, still in its primary stages of development. It has been described here because it offers an excellent example of a growing employment department, working along lines which offer possibilities of excellent future development. It has been built up from the bottom at a minimum of expense and with a small working force, thus making it of value as an example for firms in need of some such effort, but not in a position to follow some of the larger developments. It proves, moreover, the important fact that an employment department can achieve its best success only along with a big vision. The planning of its work is not limited by the immediate possibilities for development. Each step is being taken gradually, but in the mind of the director is a broad vision. Thus each of these short steps are pointing in the right direction; they will never have to be retraced even though the ultimate development be far greater than at present anticipated. It is this which makes this particular department of especial interest.

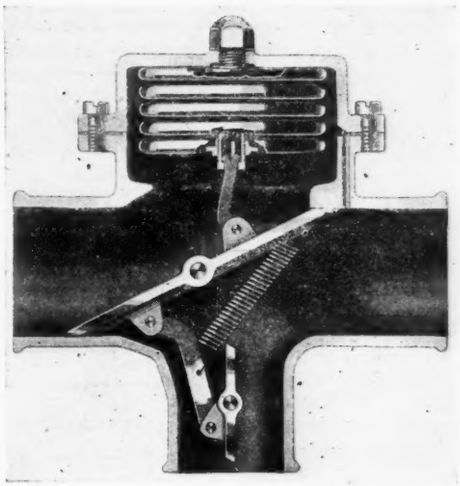
As a sample of the results attained, it is interesting to note that the turnover figures for the first five months of 1920 are lower than those for corresponding months during any of the last three years. In the month of May, 1920, the average turnover in the plants of Detroit was 26.4 per cent, while that of the Paige-Detroit factory was well below that average with 18.8 per cent.

These results are not marvelous, but are indicative of an effective, healthy department which is doing work far above the average. They have been accomplished in a factory which employs about 1450 men, and a force of four in the employment department has borne the chief burden of the work.

Thermostat Does Not Stop Circulation Through Radiator

WE show a sectional view of a thermostat that has been on the market for a couple of years, but its manufacture in quantity has begun only recently. As a result of the reduction in manufacturing cost the price has been materially reduced.

This thermostat is placed between the motor and the radiator, on the top hose connection, and a by-pass hose is connected from the thermostat to a point between the pump and motor block. When a cold motor is first started the water moved by the pump is not passed through cylinder water jackets, but is by-passed through the hose connection, the thermostat and the radiator. In other words, circulation through the radiator is maintained, while circulation through the jackets takes place only after the water in the motor block reaches a temperature of between 155 and 160 deg. By permitting circulation through the radiator at all times, the danger of freezing the water in the radiator is reduced. The thermostat is made entirely of bronze. It is known to the trade as the Rayfield. A safety device is incorporated in the construction so that should the diaphragm become punctured, the valves will immediately open and allow normal circulation.



Cross section of Rayfield thermostat. (Position when engine is cold)

Farm Tractors in Formosa

ACCORDING to a British consular report, tractors were first used on the sugar plantations of Formosa during the early summer of 1919. At present there appear to be about twenty of such tractors in use in the island. All are of American manufacture and range up to 75 hp., so far as has been ascertained. They were imported through the medium of a British firm. Two of the sugar companies have more tractors on order, and it is understood that a third is also about to make use of them. Those companies which have tractors already in use appear to be well satisfied with them, and it seems probable that a good number of the other companies will follow suit in the course of time.

To give some idea of the opening which may exist for the sale of agricultural tractors, it may be mentioned that the area under sugar-cane in Formosa is, in an average year, about 250,000 acres. There are probably over thirty companies with a capital of not less than 1,000,000 yen each engaged in the sugar industry. The aggregate authorized capital of these companies is over 200,000,000 yen, one-half of which has been called up. One company has an authorized capital of 40,000,000 yen, and three others a capital of 25,000,000 yen each. Nearly all the older established concerns have been making enormous profits during the past few years, and the present is an excellent opportunity for pushing the sale of modern appliances and machinery. Competition, however, will become increasingly difficult as time goes on.

IN the course of a recent lecture to the Chemical Society, London, Prof. J. C. McLennan said that it would be possible to produce ten and a half million cubic feet of helium gas per annum at Calgary, Canada, with a plant that would cost less than half a million dollars. The cost of the gas would be less than 5 cents per cubic foot.

Material Factors in the Gasoline Outlook

This article is intended to supply definitions of certain points that are uppermost in the discussions of the automotive fuel situation. Especial interest should attach to the presentation of stocks for the past several years and to comment on types of refineries and to cracking processes.

By Joseph E. Pogue*

SUCH widespread interest in gasoline has developed by virtue of the phenomenal growth of automotive transportation and such divergent and conflicting statements on the gasoline situation are to be found on every hand, that it becomes of interest to review the situation at the present time and appraise the various factors that underlie the supply of this essential commodity. The point of approach is that of an engineering analysis of the situation with special emphasis upon the economic aspects of the statistics and technology involved. An attempt at the same time is made to define clearly a number of terms in regard to which some misapprehension seems to prevail.

What Is Gasoline?—Gasoline is not a definite chemical compound like alcohol which can be designated by a single chemical formula, but consists of a chain or series of components ranging from volatile hydrocarbons of simple composition through compounds of intermediate properties into compounds of still lower volatility and higher density. The components of intermediate character have remained approximately the same since gasoline was first manufactured, but with growing demands for this product its boundaries have expanded to embrace hydrocarbon of high volatility as well as those of relatively low volatility. In this manner, the average character of commercial gasoline has gradually changed, especially through the inclusion of heavier hydrocarbons at the less volatile end of the series. The fact that gasoline is of an extensible nature, within certain limits, is of fundamental importance in meeting the growing requirements of demand.

Why Gasoline Is the Dominant Motor Fuel—Gasoline is the dominant motor fuel because of the remarkable coincidence of parallel development between the oil industry and the automotive industry. In the early decades of the oil industry, kerosene was the principal product turned out. Gasoline, however, was produced in growing quantities in connection with the manufacture of kerosene because of the necessity of removing this volatile component from the illuminating oil.

The development of the internal combustion engine faced such a situation and the growth of automotive transportation was highly stimulated by this condition of advance production in respect to gasoline and the low price attendant upon it. Even after the automotive demand was well under way, the fact that the production of crude petroleum was rapidly increasing under a stimulus working ahead of the demand for petroleum products, kept the supply of gasoline readily abreast of requirements. In the past few years, however, the use of automotive equipment has grown so inordinately in the face of a slowing output of crude petroleum that the whole economic situation has reversed and the pull is in the opposite direction. Now, the demand for gasoline is pressing hard upon the available supply, and the growth of the demand for gasoline is outdistancing the growth of the factors supporting the supply.

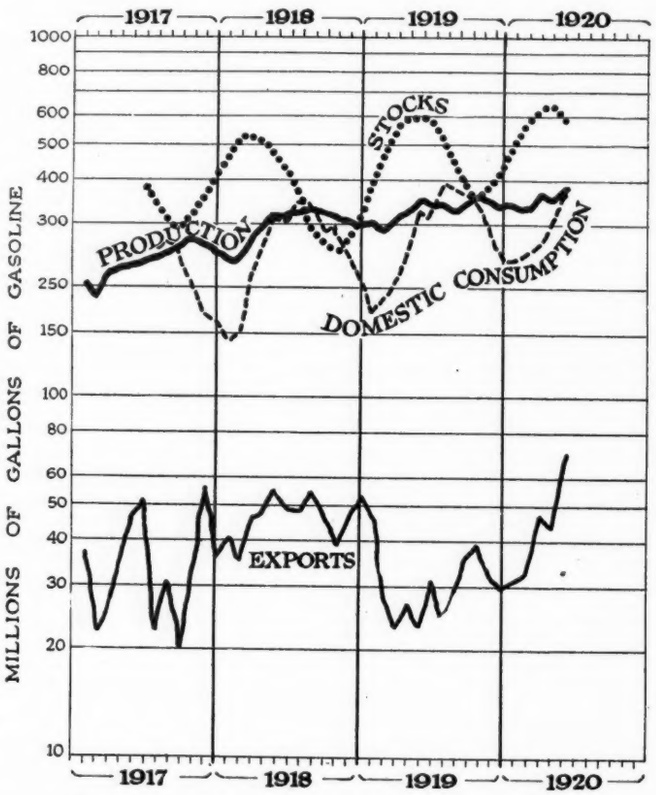


Fig. 1—Showing demand and supply conditions for the country as a whole

Dependence of the Automotive Equipment Upon Volatility.—Developing in the days of surplus gasoline, the gasoline motor naturally took advantage of the convenient property of high volatility and became standardized upon this basis. Now, in consequence, the range of hydrocarbons which may be successfully utilized in the prevailing type of internal combustion engine is somewhat narrowly limited by the rigorous requirements of the engine in respect to volatility. The volatility, or ease with which gasoline evaporates, is a word expressing roughly the adaptability of gasoline to carburetion and combustion in existing automotive equipment. In comparison with volatility, the other properties of gasoline are of minor importance.

*Industrial Economist and Engineer, Sinclair Consolidated Oil Corp.

In response to a growing need for measuring volatility in practical terms, a standard distillation test has been developed by the Bureau of Mines and is now in virtually universal use in oil-testing laboratories. By means of appropriate apparatus, this test divides the series of compounds composing the sample of gasoline into ten equal fractions, giving the temperature at which each fraction completely vaporizes. These points are plotted on cross section paper and yield a sigmoid curve which forms a graphic picture of the volatility range of the gasoline. Thousands of samples of gasoline from all parts of the country and at various periods of time have been analyzed in this manner, and periodically a survey of the country's gasoline is conducted by the Bureau of Mines.

Distillation curves and especially the evolution of distillation curves should be familiar to all engine designers and automotive engineers, as the properties represented by these curves are of the first importance in connection with the successful adaptation of engine to fuel.

End Point—In the distillation test just described, the point at which the final portion of gasoline vaporizes is called the dry point, or more commonly the end point. The end point, therefore, roughly signifies the volatility of the least volatile portion of the gasoline. In consequence, considerable discussion has centered about the end point, since any increase in end point means an increase in the less volatile constituents of gasoline and spells greater difficulty in utilizing the gasoline with equipment dependent upon a high measure of volatility.

In the past five years, the end point of commercial gasoline has increased appreciably. Without such increase the supply of gasoline would not have been adequate to present needs. This increase in end point, however, has placed the fuel somewhat out of adjustment with existing equipment, and although a number of mechanical adaptations have already come into commercial use to meet this issue, the problem of high end point has not wholly been solved.

Crude Petroleum the Dominant Source of Gasoline—Keeping in mind the complex physical character of gasoline, and noting clearly the intimate relation that exists between the composition of gasoline and the quantity that may be produced, we may examine the raw materials from which gasoline is manufactured. The dominant source of gasoline, of course, is crude petroleum. The domestic output of crude petroleum compared with the gasoline produced in the United States for the past ten years is shown in Table 1:

Table I—U. S. Supply of Crude Petroleum Compared with Domestic Output of Gasoline for the Period 1910-1919

Data from U. S. Geological Survey and U. S. Bureau of Mines
Unit: 1,000,000 barrels

	U.S. Marketed Production of Crude Petroleum	Imports of Crude Petroleum	U.S. Consumption of Crude Petroleum [a]	U.S. Production of Gasoline [b]	Ratio of Gasoline Output to U.S. Consumption of Crude Petroleum
1910	209	0.6	225	15	6.7%
1911	220	1.4	211	19	9.0%
1912	223	7.0	239	22	9.2%
1913	248	17.0	260	27	10.4%
1914	266	17.0	261	33	12.7%
1915	281	18.0	271	44	16.2%
1916	301	21.0	318	49	15.4%
1917	335	30.0	377	68	18.0%
1918	356	38.0	412	85	20.6%
1919	378	53.0	417	94	22.5%

[a] Consumption does not equal marketed production plus imports because of drafts upon or additions to stocks.
[b] Figures for 1910-1915 approximate

This table shows that the output of gasoline has been increasing more rapidly than the production of crude petroleum, which is to be explained by the fact that an increasing percentage of the crude petroleum supply is being converted into gasoline. Thus the growth in crude petroleum production is not alone supporting the acceleration in gasoline output, but changes in methods of handling the crude petroleum and advances in refining technology are also coming into play.

It is not sufficient, however, merely to consider crude petroleum as a source of gasoline; it must be borne in mind that there are many types of crude petroleum yielding different percentages of gasoline. For the present purpose, crude petroleums may be divided into two broad classes—the high-gasoline or paraffin crudes and the low-gasoline or asphaltic crudes.

Unfortunately, no exact data are available showing the relative proportions of the varieties of crude petroleums produced. Lacking such information, only general deductions may be drawn; but roughly speaking, the output of crude petroleum in the United States is somewhat evenly divided between the two types, but with a steady swing toward an enlarging output of the low-gasoline crudes. Thus, while in some instances gasoline is obtainable up to 50 per cent or even more of the crude, and in others only 2 or 3 per cent is won, the average gasoline extraction the country over is close to 20 per cent. To assume that the higher limits can be obtained from the country's entire supply of crude—a deduction sometimes made—is reasoning beyond the facts.

Relation of Gasoline to Crude Petroleum and Its Products—The relation of gasoline to the crude petroleum supply and also to the various products jointly manufactured from crude petroleum is shown in Table 2. The relationships brought out in this table should be kept clearly in mind in viewing the potentiality of the fuel oil supply as a contributor of motor fuel:

Table 2—The Volume Relationships of the Petroleum Industry in 1919

	Millions of Barrels	Per Cent of U. S. Production of Crude	Per Cent of Total Oils Run to Stills
U. S. Production of Crude Petroleum	378	100%	
Imports of Crude Petroleum	53	14%	
Exports of Crude Petroleum	6	1.6%	
Increase in Stocks of Crude Petroleum	6	1.6%	
Net Domestic Consumption of Crude Petroleum	419	111%	
Crude Run to Stills (Refinery Consumption)	361		
Other Oils Run to Stills	46		
Total Oils Run to Stills	407		100%
Gasoline Produced	94		23.1%
Kerosene Produced	55		13.5%
Gas and Fuel Oil Produced	182		44.7%
Lubricating Oils Produced	20		4.9%
Miscellaneous Products	40		9.8%
Losses	16		3.9%

Natural Gas a Supplementary Source of Gasoline—Besides crude petroleum, the only source of gasoline is natural gas. A small but growing quantity of gasoline is now extracted from the natural gas produced in the United States. The gasoline so obtained is highly volatile with a low end point and is used for blending with gasolines of low volatility (sometimes called naphthas) and for blending with gasolines made by processes of cracking. The natural-gas gasoline, or casing-head gasoline as it is sometimes called, is of greater economic importance than its quantity relative to the total gasoline output would indicate, because it is employed for "sweetening up" the portion of the gasoline supply which would not be readily available without its use. In rough terms, a barrel of natural-gas gasoline enables two barrels of commercial gasoline to reach the consumer. The output of raw gasoline from natural gas in the United States for the past ten years is shown in Table 3:

Table 3—U. S. Output of Raw Natural-Gas Gasoline for the Period 1910-1918

Year	Millions of Barrels	Per Cent of Total Gasoline production
1910	0.10	0.7%
1911	0.17	0.9%
1912	0.29	1.3%
1913	0.57	2.1%
1914	1.0	3.0%
1915	1.6	3.6%
1916	2.5	5.1%
1917	5.2	7.7%
1918	6.7	7.9%

While the output of gasoline made from natural gas has grown rapidly, its absolute contribution to the gasoline supply has been relatively small; nor is it likely to assume much more prominent proportions, since the natural gas industry is rapidly maturing and will eventually display a slowing rate of production. Therefore the aid that the gasoline supply may expect from this source has probably almost reached its maximum in a relative sense.

Straight-run Gasoline—Of the gasoline extracted from crude petroleum, the bulk is composed of volatile hydrocarbons originally present in the crude and removed by ordinary processes of distillation. The gasoline obtained in this manner may be termed straight-run or natural gasoline. If the country's production of crude petroleum for the year 1919 were averaged, its natural gasoline content would be around 20 per cent, or roughly 76 million barrels. Not quite all of this natural gasoline was extracted, yet the domestic production of gasoline in 1919 was 94 million barrels. Even counting in the contributions from natural gas, a discrepancy of some 15 million barrels is to be observed. This difference was made up by cracked gasoline.

Cracked Gasoline—A growing quantity of gasoline is now being made from a special variety of fuel oil, called gas oil, by processes of distillation employing high temperatures and pressures which partly break down or crack the material into gasoline. Such methods of distillation are known as pressure or cracking distillation, and the growth of these methods has already augmented the gasoline supply by something like 15 per cent of the total. This type of gasoline is termed cracked gasoline; it is not used directly as such, but is blended with straight-run and natural-gas gasoline.

There is a good deal of misunderstanding as regards the possibilities of cracking processes, partly because the details of such processes are carefully guarded and little exact information is generally available on the subject. There has been a tendency, therefore, to superficially appraise cracking as a method for converting fuel oil into gasoline, without reference to the physical and economic limitations to the process. The common line of reasoning in this respect is to take the country's output of fuel oil, which is roughly 180 million barrels, and to assume that this quantity can be quickly converted into gasoline, as demand increases, by simple additions to refinery equipment.

Cracking is the most important single factor capable of enlarging the supply of gasoline from a given quantity of crude petroleum, but while cracking processes are legion, very few have attained commercial success, and those which are of practical importance have been unable as yet to attain a working efficiency much higher than 40 per cent. Also only certain light grades of fuel oil (so-called gas oil) have as yet proved broadly suitable as a raw material. While, of course, the art of cracking may be confidently expected to advance, the fact must be faced that under present conditions of that art less than 40 per cent of the fuel oil supply of the country, even granted it could be diverted to such treatment, represents potential gasoline.

On the whole, therefore, while highly significant additional contributions of gasoline may be expected from the avenue of cracking, an unlimited expansion cannot be counted upon on this score, and it is questionable whether cracking can be expected to expand at a very much greater rate than has characterized the process in the past few years.

In spite of the physical and economic limits inherent in cracking, however, the fuel oil supply of the country may be regarded as a motor fuel reserve which ultimately will come broadly under requisition for this purpose. Such a view is corroborated by the recent tightening-up in the fuel oil supply and especially by the stringency that has lately come into evidence in respect to the supply of gas oil (the preferred variety of fuel oil for cracking). The gas oil shortage, indeed, has aroused widespread interest on its own account, and the gas industry is much put out in regard to its future supply of gas oil. Where a product of this nature becomes involved in two competitive demands, the demand of higher economic type is bound to win out.

If this reasoning, which is based upon innumerable analogies, is correct, the gas industry must prepare to see its supply of gas oil ultimately entirely diverted into motor fuel channels, and this outcome may be expected to be repeated in respect to the other industrial portions of the fuel oil supply in inverse order to their economic rank.

Types of Refineries.—In addition to the types of gasoline just reviewed, there are broad distinctions in refinery practice which have an important bearing on the quantity of gasoline produced. In the most general terms, and without regard to strict technical accuracy, the refineries of the country group themselves into three kinds: (a) skimming plants which remove a portion of the gasoline and kerosene from crude petroleum, selling the residuum as fuel oil; (b) intermediate plants which carry the process of refining still further, but focus on the maximum output of gasoline and kerosene; and (c) lubricating plants whose main effort is directed to the maximum production of lubricating oils, with secondary attention to the output of the volatile products such as gasoline. The skimming plants and many of the intermediate plants use dry or destructive methods of distillation, which force the yield of gasoline somewhat above the natural gasoline content; but in lubricating plants, the emphasis being upon the production of high grade lubricants, steam refining is introduced which tends in general to hold the gasoline output to the natural content of the crude.

Since a steady evolution is to be observed from skimming and intermediate plants to lubricating plants, as the demand for lubricating oil increases, a relative diminution of the gasoline supply is to be counted upon on this score. There are many other elements which come into bearing that cannot be gone into for lack of space, but it must be recognized that as important as motor fuel is, lubricating oil is still more vital, and here, likewise, the higher economic demands will take precedence. Data are not available for measuring quantitatively the effect of growing lubricating output upon the supply of gasoline, but the results while not critical will be appreciable, although they will be hidden beneath the effects of counter developments for increasing the supply of motor fuel.

Current Supply of Gasoline—Considerable interest is naturally expressed in the current supply of gasoline and the possibility of stringency during the late summer of

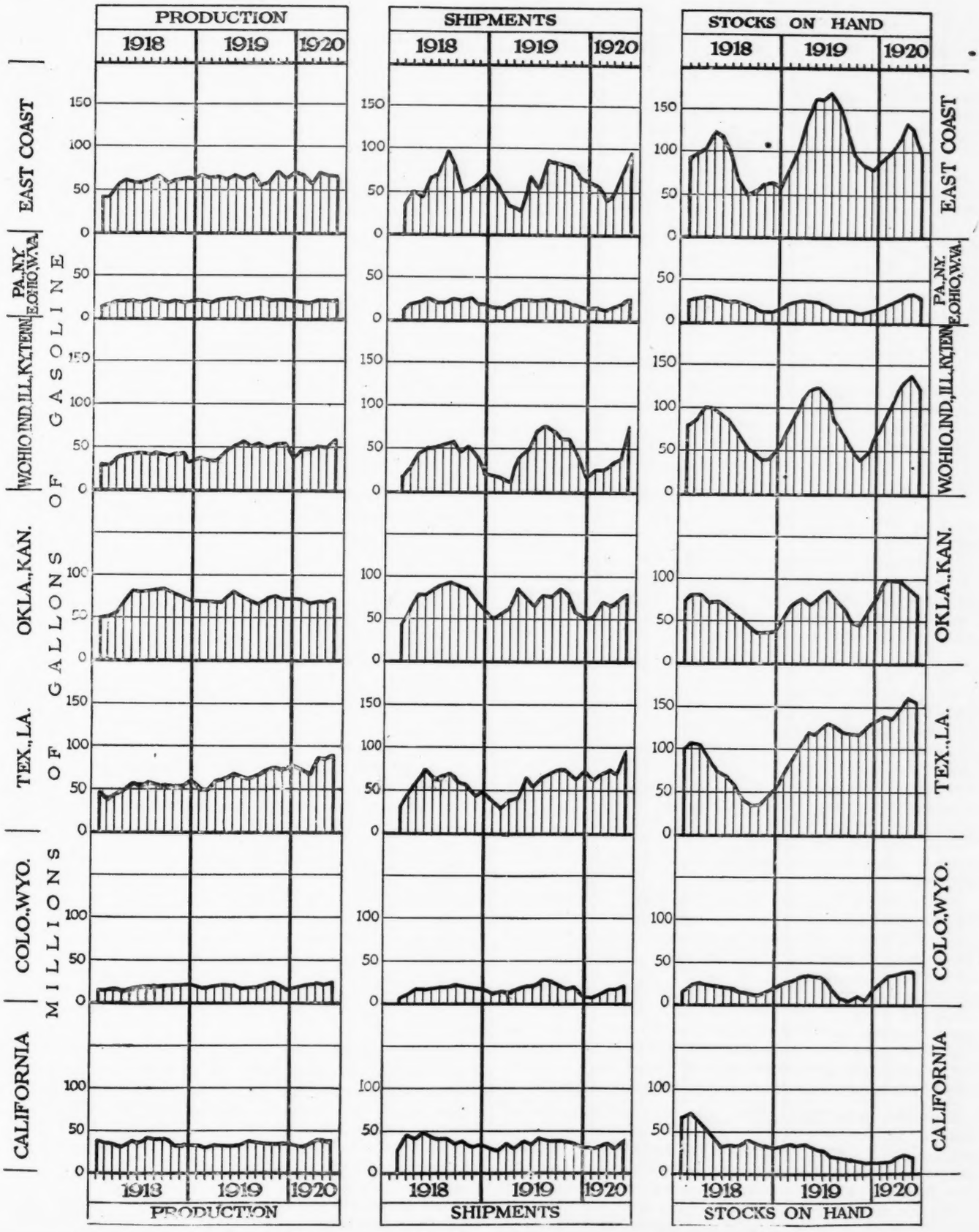


Fig. 2—Monthly production and shipments compared with stocks on hand

the present year. It is difficult to accurately appraise the conditions immediately ahead because of the fact that statistics are tardily available, and while the season is already well advanced, the figures upon which judgment must be based are obtainable as yet only for the first few months of the year. Instead of drawing conclusions from incomplete evidence, the writer presents in graphical form the monthly figures published by the Bureau of Mines for individual consideration. Fig. 1 represents the demand and supply conditions for the country as a whole, while Fig. 2 shows the monthly production and shipments, compared with the stocks on hand, in each of the seven refinery districts of the United States. Fig. 2 clearly shows why the situation in California is already displaying stress, since the stocks were not normally built up during the past winter and by April, 1920, had sunk to unsound depths.

Price of Gasoline—Widespread interest among the consuming public, of course, is directed to the price of gasoline. The price of this commodity is controlled by certain fundamental economic factors which are not widely understood. Gasoline is produced from crude petroleum jointly with kerosene, fuel oil, and lubricating oil, and the monetary returns from these four products must support the cost of raw material, manufacture, and distribution. Any variation downward in the price of any one of these products must be compensated by an upward price reaction in respect to one or more of the others, unless financial loss and a stoppage of production are to ensue. This condition is inherent in the nature of the oil situation.

During the past year crude petroleum has been advancing rapidly in price in the United States under a complexity of stimuli, the most important of which has been the inadequacy of production as compared with demand. This advance in the price of the raw material from which petroleum products are fabricated has caused a price advance in the petroleum products themselves. Under the give and take of a complex and rapidly shifting range of demands, the increases in the price of petroleum products have shown differential advances, and, in general, the price of gasoline has advanced more sluggishly than that of crude petroleum or the other petroleum products. This may be a source of congratulation to the gasoline consuming public, or it may indicate further advances to come. That no one can foretell, but in the past it may be observed that price advances have fallen more to the lot of related petroleum products than to gasoline.

Unfortunately for the future, the supply of crude petroleum in the United States is inadequate for supporting the rising structure of demand, and in consequence a price impetus is at work on crude petroleum which may run to much further lengths. A margin, of course, must be maintained between the cost of a raw material and the combined price of the products made from it, and the mere maintenance of this margin in the face of increasing costs for crude petroleum will entail a rising price for gasoline, though tempered in all probability by favorable differentials in respect to the other oil products.

Gasoline Substitutes—With the increasing price of gasoline and the possibilities of an ultimate stringency in supply, more and more attention is naturally turning to compounds which may be made to replace gasoline. In this field the wildest statements prevail and the utmost caution is necessary for appraising the true situation. It should always be borne in mind that motor fuel is required in such staggering quantities that the problem of developing a substitute to the requisite volume must be a matter of many years, even granted an adequate resource and appropriate technology. The only products which have immediate significance in this connection are benzol, a by-product from the distillation of bituminous coal, and alcohol, made from organic materials.

Unfortunately there are serious limitations to what may be expected from either source. The production of benzol depends upon a costly and elaborate chemical industry which has thus far grown but slowly and has little chance for ultra-rapid expansion in the immediate future. The output of benzol at the present time is of an order of magnitude of about 50 million gallons a year, which is only 1 per cent of our gasoline requirement; and even if the benzol were extracted from all the bituminous coal brought into use, the supply would fall far short of our present needs.

Alcohol likewise has limitations. In the first place, the supply of materials available for the manufacture of alcohol is limited, and in the second place, there are legal restrictions to the free output of alcohol which stand in the way of rapid development of the industry, and which at present are actually retarding this matter. The present output of industrial alcohol is roughly of the same order of magnitude as that of benzol, and while the output of alcohol may be expected to increase, there is no possibility whatsoever that quantities running up into hundreds of millions of gallons can be easily or quickly brought upon the market.

Effective service in the internal combustion engine is possible with either benzol or alcohol, especially if these products are blended with petroleum products. Certain fuels of this general type have already met with some success and every encouragement should be given their future development. On the whole, however, benzol and alcohol hold better promise as blending agents in connection with petroleum products than they do as single fuels; but the utmost that may be expected from them in the calculable future is that they will augment by a small percentage the total supply of motor fuel.

The Future Supply—It is difficult, of course, to speak with assurance on the future supply of motor fuel. It is possible, however, to measure with some degree of accuracy the factors entering into the present supply and the rate of growth of the demand. It is indisputably true that the demand is growing faster than the factors underlying the supply. Of course production and consumption are running roughly parallel, but production during the past two or three years has been able to keep pace only through the progressive taking up of the slack in the situation. Prior to 1917 there was considerable crude petroleum produced in excess of that required for the extraction of gasoline. This item of slack has run out. Further contributions of natural-gas gasoline may be expected and cracking likewise may be looked to for considerable increments. The development of cracking, as already pointed out, will cut rapidly into the fuel oil supply of the country, creating other fuel problems of a serious nature.

No mention has been made of the contributions of crude petroleum which may be expected from foreign sources of supply. There are undoubtedly large deposits of petroleum in Mexico, Central America, and South America, part of which will become available for consumption in the United States. These contributions, however, are subject to so many uncertainties, not only of a physical but of a political and economic character, that it is difficult to appraise adequately this avenue of relief. Wide diversity of opinion likewise obtains here and the conclusions expressed so freely in the press are largely a function of the optimism of the one who originates them. On the whole, however, contributions of foreign oil in the

magnitude needed to support the situation on its present basis of technology must be startlingly great, and it is difficult to see how imports can be increased rapidly enough to satisfy the motor fuel situation, especially in view of the fact that the foreign crude petroleums immediately in sight are mostly of a low gasoline content.

Cracking Pivotal—The analysis of the situation presented here points unmistakably to the dependence of the automotive industry upon a rapid development of cracking processes in order to quickly bring into play the fuel oil reserve. It would appear, however, that the demand for motor fuel is growing even more rapidly than the capacity of cracking to meet the issue. If this conclusion is correct, either a certain margin of demand must go unfilled or the demand must change its physical character so as to enlarge the available supply. The possibilities in this direction are two-fold. In the first place, greater efficiency can be won from the fuel now used, and in the second place, mechanical equipment can be gradually adapted to a lessened dependence upon volatility, a quality which now is coming to be a factor seriously limiting the quantity of motor fuel producible.

To attain these ends involves a very intricate and perplexing problem. Above all a satisfactory solution requires anticipation of results before they are reflected in matters open to direct observation. In addition to this, an adequate solution will require a degree of co-ordination between the oil industry and the automotive industry which will be difficult to attain without more universal agreement on the premises of the matter than is as yet in evidence. Some headway has of course been made, but little has been done in keeping with the true needs of the situation.

The Real Issue—The real issue ahead, the solution of which is to the advantage of the oil industry no less than the automotive industry, is to make quickly available the reserve of fuel oil for automotive purposes. Many believe that this can be done by the development of cracking processes unaided by serious adaptations on the part of the engine and engine equipment. It is the belief of the writer that cracking unaided cannot wholly meet the issue, and therefore the development of cracking should be accompanied by mechanical adaptations on the part of automotive equipment, in order that the growth of automotive transportation may not be retarded by limitations in the fuel supply, or increase in fuel price growing out of such limitations.

Possibilities of Two Fuels—If the conclusions in the last paragraph are accepted, it becomes necessary to consider whether automotive apparatus as a whole should adapt itself to a supply of fuel gradually rising in end point which eventually would quickly embrace the supply of kerosene and ultimately the output of fuel oil; or whether the automotive industry would obtain better results by dividing into a light-traction and heavy-traction portion, the first to be dependent upon volatile motor fuel or gasoline, the second to base its requirements upon non-volatile fuel, or distillates heavier than gasoline embracing fuel oil. Such a dilemma is faced by the automotive industry in the give and take of industrial evolution, but unfortunately the alternatives are complicated by the economic and social status of kerosene. It is questionable whether kerosene can be done away with entirely, especially in view of its great social importance in rural districts, not to mention the contributions that it makes to the backward peoples of foreign nations.

If a large quantity of kerosene must continue to be marketed, its chemical position between gasoline and fuel oil makes it necessary that refining processes divide the fuel content of crude petroleum into volatile distillates and non-volatile distillates, and hence we will continue to have two fuels. On the other hand, the economic advantage of a single fuel becomes outstandingly great in connection with the matter of its distribution, it being far cheaper to distribute a single fuel than to furnish the manifold points of consumption with two fuels. This problem, however, is merely mentioned as an aspect of the situation which has frequently been overlooked, and is suggestive of the broad point of view that may be brought to bear on the whole situation.

Complexity of the Motor-Fuel Problem—It is apparent that the problem of maintaining a supply of fuel adequate to the needs of automotive transportation is not a simple or an easy one. The supply has been kept adequate to present needs by a bountiful production of crude petroleum which has thus far sustained a rapid increase in consumptive demand. Conditions of supply, however, are unmistakably tightening up, whether viewed in regard to crude petroleum or as regards gasoline, and hence we are faced by a consumptive demand that is out-distancing the supply. With possibilities of a lagging volumetric output of raw material, emphasis naturally falls on technological factors both in refining and in mechanical equipment having to do with consumption, which will contribute a maximum easement to the supply.

These adjustments involve an interplay between two great industries and in consequence entail a problem of peculiar perplexity. It is on this point that the whole matter would seem to hang. The interests of the automotive industry and the oil industry and of the public are one—the furtherance of automotive transportation. Only by the broadest type of co-operation on the part of all concerned can the maximum progress be attained.

Truck Manufacturers Favor Hub Standardization

(*Continued from page* 355)

motive Metal Wheel Association held at Niagara Falls on Aug. 10, a progress report was made which shows the work is moving and that a proposed standard for front wheel spindles at least should be submitted at the next meeting, which will be held at the Union League Club, Chicago, on Oct. 12.

Large truck dealers who have viewed with alarm the necessity of keeping a large amount of capital tied up in service stock are regarding the movement very favorably and are hoping that progress will be made as rapidly as is consistent with sound engineering. It is realized that there is no desire to uproot present practice nor to throw out present types. The change has got to come gradually, and there will be no necessity for scrapping material on hand. Inasmuch as there is considerable design work in prospect, however, it is desirable to have the standards drawn up as soon as possible and approved by the axle and wheel manufacturers; so that when new designs are brought out it will be possible to begin the use of the standard types.

FOLLOWING the lead of other institutions the Institution of Automobile Engineers (Great Britain) has decided that women shall be admitted to membership.

The Fulcrum of a Rearing Tractor

Editor AUTOMOTIVE INDUSTRIES:

I have noticed a number of articles published recently which dealt with the stability and resultant ground pressures of tractors, with the presentation of which I could not always agree, but the controversy between E. F. Norelius and P. M. Heldt over the tractor fulcrum question really tempts me to state my reasoning.

Lives have been lost because tractors overturned when the available power was applied and resistance offered by outside elements. It is imperative, then, that the future vehicles should be so balanced that they will not turn over by their own power. We are, therefore, interested mainly in a tractor under dynamic conditions, not static.

I certainly agree with Mr. Heldt that a too general formula can only lead to either approximate results or erroneous interpretation, because such a formula is bound to neglect minor factors which at times become more important than anticipated under all assumed conditions at the time of its origination. How far we might go at arguing over conditions which will hardly ever arise is shown by the question of what effect the location of drawbar below the axle will have. Mr. Heldt claims that it is impossible for a tractor to go backward when the wheels tend to propel it forward. It is inconceivable for a vehicle to be designed out of proportion to that extent, yet it is possible to have sufficient torque and a drawbar hitch in the form of a rope around a pulley with an infinite restraint placed at the drawbar, the tractor wheel can rotate as if going ahead and yet the tractor would move backwards.

The practical engineer always makes his assumptions within the practical possibilities and will at times overstep in his statements, giving others opportunity for argument especially if it does not make any difference how far-fetched the assumptions might become. In the few following lines I will confine myself merely to constructive reasoning, such as I have found useful to avoid gross error.

A tractor can be unstable when going down an incline with the brakes applied, but because nearly all commercial tractors have the center of gravity back of the wheel-base center, the danger of overturning is far greater when negotiating an up grade or an obstruction giving the equivalent angle. What I mean to bear in mind is a spring suspended tractor negotiating a hill or a ditch.

On a wheeled tractor the fulcrum is either at the center of the rear wheel or at the ground contact, depending on the extent of torque expended. As long as the rear wheel rotates, the axle center must be the fulcrum for all forces applied. When the wheel becomes blocked, the positive forces tend to lift the front end, using the center of wheel as fulcrum. When the gravity center of tractor (minus rear wheel and axle) falls perpendicular over the rear axle center, no further torque is required because the momentum will turn the tractor over. It is then just a question whether the rear axle drive assumed a set position at the time of turning over, or whether the drive continues rotation. In the first case the point of ground contact will have become the fulcrum and in the latter case the center of rear wheel remained the fulcrum.

A caterpillar tractor has a greater amount of unsprung weight than the wheeled job. The sprung weight has its fulcrum at the center of the rear wheel until the front end is lifted high enough and part of the unsprung mass is beginning to leave the ground; then the ground farthest to the rear touching the track becomes the fulcrum for the entire tractor, but that point will not remain constant and will change, depending on ground formation and spring loading. While the changing rear point of contact with ground acts as what might be called the outside fulcrum for the gravity force in the tractor, the rear axle center still remains the fulcrum for the applied torque until the center of gravity falls perpendicular through same. It is readily understood that the point becoming the fulcrum for the entire tractor is as changeable as the ground condition and therefore an unreliable quantity and cannot be predetermined. It is also easily realized that the stability of a tractor depends on the sprung mass, because it will take a comparatively small effort to overturn a properly designed caterpillar tractor once the front end leaves the ground. It seems advisable to depend on the stability obtained by sprung weight, because the fulcrum location up to the danger point remains constant for that mass, and the calculation is, therefore, reliable. The moment due to unsprung weight is always to be added, but by this procedure the entire calculation of stability is not jeopardized by a possible error in the determination of the location of fulcrum. Practically the same reasons are to be advanced for the method of ground pressure calculation. Any appreciable amount of the tracks should never leave the ground at front or rear, therefore the unsprung mass causes a ground pressure which is constant, changing slightly in magnitude with the severity of grades to be negotiated, but the sprung weight with its forces constantly changing acts upon the ground through the springs and determines the characteristics of the ground pressure curve.

A treatment of the caterpillar tractor weight question and the distribution of weight for stability and maximum performance is very interesting, but also quite involved, and I will only add my opinion that an engineer who does not understand how to balance the torque and useful drawbar pull by proper weight distribution cannot be trusted with the design of a caterpillar type.

H. A. SCHWAGER,
Engineer-in-Charge of Design,
Tank, Tractor and Trailer Division, Ordnance Dept.

WHEN the tap hole of a blast furnace becomes frozen, that is, filled with solidified metal, it is opened as follows: A piece of ¼-in. iron pipe with a brass handle, at least 10 ft. long, is attached to a manifold of several oxygen cylinders. Oxygen is delivered through this pipe at a pressure of approximately 100 lb. p. sq. in. A hole is started with a star drill or diamond point, until it is about 3 in. deep. The metal adjacent the hole is heated with a fuel oil burner or by other means. The end of the iron pipe is ignited and the composite stream of molten iron slag and oxygen caused to impinge against the frozen cast iron.

Instructing Employees in the Elements of First Aid

Experiments have been made in a number of plants in the instruction of all employees in first aid work; some plants have done it for years. In this article, effective methods for establishing and carrying on such a course are outlined and the possible benefits accruing are pointed out.

A MACHINIST in a large manufacturing plant was running a screw machine. He had left a wrench on the top of the machine and, when he threw in the clutch, the wrench was jarred off. He was eager not to lose any time, so he slapped on a quid of tobacco, tied up the wrist with a rag and went on with his work.

Five days later he went up to the office of the company physician. His wrist was so inflamed that it was evident that he would have to lay off for some time.

"Why didn't you come up here right away?" said the nurse who dressed his wrist.

"For a little scratch like that?" he exclaimed. "Why, the boys would be running up here all the time."

"Then you ought to know what to do for them yourselves," she said.

Even when plenty of doctors and nurses are employed by the plant, instruction in first aid and accident prevention is desirable. Although repeatedly encouraged to do so, men will not go to the doctor for minor injuries. In the case of more serious injuries, even though skilled assistance may be obtainable in a few minutes, it is just in this dangerous interval that irreparable damage may be done.

As a part of its peace-time work, the American Red Cross is carrying on first aid instruction in a number of plants, including the Western Electric Co., Bethlehem Steel Co., Bell Telephone Co., Sears-Roebuck & Co., Hillside Coal & Iron Co., and others. The methods have been especially adapted to industrial conditions. Where there is already a medical department in a plant, the Red Cross has simply offered its service in co-operating wherever possible. In other plants it has, through the medium of physicians, assumed the burden of giving the instruction at the request of the manufacturer. The expense to the manufacturer in the establishment of such a course is negligible, including only the cost of materials needed for illustrative work.

The actual methods of installing such a course in any given plant must, naturally, vary with individual conditions. Following are some of the methods thus far found effective in the plants mentioned. It will be noted that various means are used to arouse and sustain the interest of the men in the instruction. This is vital since compulsory training cannot accomplish the desired effect.

1. In planning classes the best method is to choose one or two of the older men, probably foremen, from each group in the plant and assign them for instruction. This insures having a trained man at hand when an accident occurs. Eventually, however, all the men may be trained.

2. Ten to fifteen is the ideal number for a class, although twenty-five may be included. The course, as required for Red Cross certificates, consists of 15 hours' instruction, chiefly by practical demonstrations.

3. The company physician is the logical instructor but any other competent physician may be chosen.

4. As an incentive to arouse interest, Red Cross certificates may be given to those who complete the course. (Any local Red Cross chapter will supply all detailed information desired and will, if requested, secure an instructor as well as the necessary charts and supplies.)

5. When a course is finished an examination should be held to determine the proficiency of the men and to serve as a basis for awarding the certificate.

6. Practice should be kept up by frequent drills. During these drills special accidents may be discussed by first aid crews and ways of avoiding them made clear. An actual patient should, in these cases, be treated for the imagined injury.

7. Interest can be kept up by holding advanced courses at proper intervals. The men may be awarded a Red Cross medal for the first of these courses, and a bar for each repetition up to three. These advanced courses should be a review of practical work and are but half as long as the primary course.

8. Competitions between teams from different departments or shops also serve to keep up interest and practice. The Red Cross has worked out rules for these "First Aid Contests."

9. It has been found best to hold all instruction on the employer's time.

In reply to an inquiry from AUTOMOTIVE INDUSTRIES regarding the value of first aid instruction to all employees, Dr. Loyal A. Shoudy, chief surgeon of the Bethlehem Steel Co., wrote as follows:

"We have safety committees for each department of our steel plants who are instructed in general safety. These committees change each year and in time all of our employees will have had instruction in safety and first aid.

"It is hard to tell you all the benefits because they return to us in so many ways; chiefly—

1. Fellowship and good feeling
2. Elimination of many accidents
3. Injured men intelligently handled
4. Infected wounds decreased
5. Eyes better cared for
6. Gas and electric accidents better handled
7. A better understanding of human relations—brother's keeper idea among the men."

Liability insurance companies, such as the American Mutual Liability Insurance Co., Travelers Insurance Co. and the Aetna Accident Liability Insurance Co., have reduced their premiums and accident rates to companies where the men are trained in first aid and where first aid equipment has been installed for injured employees. A reduction of 1 per cent has been made on the premiums of industrial concerns that are provided with a first aid kit. A reduction of 3 per cent has been made to companies which have instructed their employees in first aid and provide a dispensary building or room with running hot and cold water, set apart from the work rooms and containing a stretcher and first aid outfit. To industrial plants which have licensed physicians who are available to call during all working hours and make at least semi-weekly visits to supervise the medical work of the plant and when the employees of the plant have been instructed in first aid, a discount of 5 per cent is allowed.

Seizing the Present as the Time to Solve the Problems of Labor

The severity of the labor difficulties having passed, due to the slackening of employment, the moment is propitious for seeking a common understanding with the workers. How this has been done in some plants already and how it may be applied to others, is the subject of this article.

By Harry Tipper

THE reports which have been received of late from different manufacturing centers indicate that the efficiency of labor per man per hour of production is increasing and that the demands are not imperative or as continuous as they were. There are a good many strikes going on, and the disturbances which are occurring in various localities and in connection with various lines of industry show that the unions believe it is to their advantage to continue the campaign for shorter hours and shorter pay to some extent.

Few of these disturbances, however, are connected with the heavy metal trades and similar industries, and in the cases where they occur in connection with these trades they are not of vital importance. How much of this difference can be attributed to the slackening in employment and the slackening in the scarcity of skilled labor cannot be estimated. It is undoubtedly due, in part, to the fact that the increased wages have proved incapable of providing the surplus which was anticipated by the worker when they were first secured and the necessity for continued work is being forced upon him by this new estimate of his condition. The slackening of employment is very much more marked in some lines of industry than it is in the automotive field, but in many centers it is sufficiently important to lead to a considerable increase in the numbers of those who are unemployed at any given time.

Most of the reports which are received state the matter by saying that labor conditions are returning to normal, but this statement is not sufficiently analytical and is likely to be misleading if it is taken at its face value.

> **What is meant is that the severity of the difficulty has passed and it is possible to continue operations without the same amount of interruption and without the continual necessity for negotiation. In this respect, of course, the surface conditions are more nearly normal and according to our previous conception of the most efficient type of the industrial organization. It is impossible to go back, however, in a human sense, and it is impossible to blot out the aspirations which became articulate at the close of the war and which expressed themselves in the labor turmoil that occurred at that time.**

While the interruption is likely to become less and less important for some months at any rate and the efficiency likely to increase slightly per individual, the desire for a new deal in industrial organization, which found its expression during the year after the close of hostilities, is still in existence and will not be forgotten although it may be repressed. The return to more usual conditions of operation, however, will make it possible for the workers, as well as the executives of manufacturing establishments, to consider practical ways of securing a better type of human organization in industry, to discuss the question with more freedom and less demand, and consequently to act more sanely in connection with the matter.

I was very much impressed with this condition and the importance of this opportunity for the manufacturer who desires improved relations with his men by the story of an engineer who had charge of the introduction of new production methods in connection with a number of pulp mills. The unions were not only strong in the mills but they were autocratically organized, rough in their methods, dominating the social as well as the production life, very imperative in their demands and dealing with the situation in such a way that the effect upon production and the social life was equally detrimental. They were frankly against any change in production methods, they were frankly in a position to enforce their demands, and they admitted that they did not care what effect these demands had upon the owners of the establishment. Yet, by understanding the difficulties, enlisting their judgment, developing their sense of partnership in the work before him and frankly placing all the cards on the table, this engineer was able to change this whole situation.

Lack of uniformity and slow production were eliminated, better methods were introduced, and the grievance committees of the local unions were turned into betterment committees for the improvement of production in the plants. In fact, in a remarkably short time the whole spirit of the unions was changed, so that there was a decent agreement between the employer and their subordinates, the exercise of a decent influence upon the social life and a different spirit in relation to the production among the men. The labor leaders concerned who had become interested and aided the engineer explained the matter by saying that his work made it possible to return to the old spirit of craftmanship because the man could put his own intelligence, initiative and judgment into the improvement of his job.

> **A year ago among men of this type, real "rough necks," the same consideration of the case might have been almost impossible, but to-day with the abnormal conditions forgotten, except the abnormal difficulties of living, and with nothing left but the increased aspirations on the part of the men, in other words, with the heat gone out of the atmosphere and all parties cooled off somewhat, discussion led to understanding and understanding to developed improvement.**

In the minds of many executives there exists either a great timidity or a great fear of the results of talking things over with the workers and of telling them too

much. Just as many people have a fair understanding of human nature outside their own family, but are utterly incapable of estimating actions and motives within that circle, many executives are thoroughly conversant with human reactions in the market and in social life, so long as these reactions are not concerned with their own establishment. But they are utterly incapable of properly estimating the reasons for action and the strength of motives within that circle. If the things which are of common difficulty and common necessity in the manufacturing establishment cannot be discussed between the workers of that establishment and the executives who are responsible for that work, outside events can do little to improve the situation. The intimacy of the problem, which exists in the common necessities, provides a topic or topics calculated to draw men into a common understanding more quickly than anything else. It is, of course, necessary that the supervisor and manager should have a greater understanding of the worker than the worker has *pro-contra*, for he must prove his leadership in this respect if he is to sit down and discuss these common problems and difficulties.

This part of the work is much easier in a small establishment where the distance between the owner or manager and the subordinate is not so great, and there is some contact throughout the concern. Not infrequently, however, the smaller establishments have neglected the matter to a greater degree than some of the large organizations, and in this they have neglected the important opportunities for the education of the worker and the provision of a stable body of workers possessed of some understanding on industrial necessities. The smaller establishments comprise by far the majority of the organizations of an industrial character in this country and employ the majority of the industrial workers. In most cases, however, the employers and employed are just as far apart in these organizations and, in fact, they are frequently further apart because the suspicion bred by the ignorance and lack of responsibility acquires a personal animus which is lacking in the larger organization.

Two or three weeks ago in one of these articles, I mentioned this as a particularly good time to discuss matters with the worker. In the smaller establishments there has been an opportunity at all times to approach these problems with less formality and with a larger probability of success, without too great a measure of difficulty. If the vast majority of industrial establishments that are comparatively small would get together with the idea of providing some basis of understanding and some basis for arousing the interest and the intelligence of the individual worker in production efficiency, the improvement in industrial relations will be nothing short of miraculous. In all plants there is a sufficient amount of waste and lost motion to attract the attention of the worker and conversation with workers frequently discloses the fact that they do not believe there is any real push toward improved efficiency on the part of the management.

I have had workers cite instances of waste which occurred in their particular department and for which they themselves felt they could suggest the remedy and express their disbelief in the real desire for efficiency, owing to the neglect of these matters. Many of these causes of waste can be improved only with the co-operation of the workman and many of the remedies must be suggested by him unless they are to be improved with great difficulty and very slowly. The interest and the initiative of the workman can be harnessed for this improvement in the smaller establishments by discussion which illuminates the policy of the management and the determination for fair play in the reward.

Incidentally that spirit of craftsmanship and of pride in the results of the work, which we so much desire to secure, can be brought back and has been brought back in some of the establishments where the management has taken pains to encourage it, by allowing the worker to use his intelligence and initiative in connection with his work.

It does not take long for information of this kind to get about. The work which was done by the engineer I mentioned has been noised about in labor circles, so that it has eased his way in every establisment with which he has had any connection, and his future work will be simplified by the reputation he has secured among labor leaders not only for honorable square dealing but for his ability to arrange matters so that the judgment and initiative of the workman is developed.

There is a time to be cautious, but there is a time to be bold in the development of sound principles of organization and there is no doubt that the present is a time which will repay the man who has determined the sound principles of relations between employers and employed and is bold enough to talk them over with his men and to organize for their development.

Labor Turnover Costs Money

IT is neither possible nor desirable to reduce labor turnover to nothing. There always will be a certain small percentage that is desirable from the standpoint of the manufacturer. This will include men whose work is definitely unsatisfactory, men whose services must be disposed of because of curtailed production, etc. Few firms, however, have even approached this desirable minimum.

One automotive firm in the East had a labor turnover last year of 400 per cent, while one department recently had a turnover of something like 300 per cent in three months. An executive of the company was queried as to the underlying causes for such a condition. His answer showed that no attempt had been made to analyze the situation. The firm employs approximately 600 men. If 30 be taken as a conservative estimate of the cost of hiring and firing one man, then the cost of turnover for the year reveals the amazing total of $72,000. Certainly the item of loss is large enough to call for careful study and hard work to eliminate it.

Reducing the turnover is a task calling for abilities of a high order. It calls for a man who can understand human nature in its broadest sense, who can perceive underlying causes and analyze them intelligently. Money spent in paying a low-grade man to work on the problem as employment manager is simply throwing good money after bad. Such a man may even increase the percentage.

The size of the yearly loss in this one firm, for instance, is large enough to call for a liberal salary for a first-class executive. If, by his intelligent efforts, the turnover were reduced, let us say, to 100 per cent—a percentage that has been attained in many plants, and not nearly as low as in many others who have carefully studied their problem—the saving to the firm would be something like $54,000 a year.

The above figures, of course, are arbitrary, but are used to illustrate in a definite way the possibilities for actual financial saving through a thorough study and intelligent handling of personnel problems.

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& AUTOMOBILE

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Looking Ahead

MANY factories are laying off men. Especially have large numbers been thrown out of work in the rubber plants of Akron. But this condition is only temporary. Every official in the various companies believes that within a few months demand will grow again and production will again be raised to its highest point.

Even with this belief, however, few firms are realizing that one of the big problems in bringing up production again will be the building up of a new working force. One of the tire companies has adopted a far-seeing policy in this respect.

The name and permanent address of every man laid off at this plant is recorded at the labor department and the man is encouraged to notify that department of any change in address. He is given to understand before leaving that the company regrets the necessity for lay-offs and is told that he will be notified as soon as things pick up again and a job is open for him. In other words, the labor department is taking the trouble to keep in touch with as many of its good men as possible.

When it comes time to build up the force the men will be given first choice of the jobs and the best men will be notified and brought back to the plant. To tie a man up with the firm in this way at the time he is laid off, does not call for an infinite amount of time and costs only a little extra effort. But when it comes time to rebuild the working force the time spent will return to that company in the form of many dollars saved, since it will not be necessary to go out entirely after green men or after men unfamiliar with the plant and the organization.

Fuel Economy

IT is generally agreed that our present automobile engines use fuel very wastefully. With the lightest cars on good roads it should be possible to cover from 30 to 40 miles on a gallon, while less than half this is usually obtained. Many people seem to think that, considering the quality of the fuel as an unalterable condition, the fault lies with the carburetor. This, however, is hardly correct, for there are now quite a number of carbureters on the market which give a substantially constant mixture throughout a wide range of air speeds.

This statement might revive the old controversy as to whether the mixture should be of the same richness whether the engine is running under light or heavy load. It is an incontrovertible fact that one pound of air will completely burn 0.065 lb. of gasoline; it cannot burn more, and if more is fed some of it will pass through the engine unconsumed or at least only partly burned. If not enough heat is supplied under certain conditions of operation to vaporize the heavier constituents of the fuel, then a carbureter giving a richer mixture for that condition of operation may be of advantage, from the standpoint of power. From the standpoint of economy, the proper remedy is to supply enough heat to vaporize all of the fuel and not to feed an excess of fuel.

The two chief reasons for lack of economy in the use of our present motor fuel are: (first) that the engine is usually operated under small load, and small load operation with a four cycle, throttle controlled engine corresponds to operation at low compression, which is an uneconomical condition; and (second) that the heavier constituents in the fuel are not reduced to the gaseous state before the explosion occurs and pass through the engine unconsumed.

On the basis of 20 per cent engine efficiency at the clutch, 75 per cent transmission efficiency and 50-lb. traction resistance per ton, a 3000-lb. car should travel 34 miles per gallon. In practice about one-half this economy is seldom exceeded.

It has been said that the Otto cycle engine is a very poor type from an economy standpoint. The criticism applies more particularly to the throttle controlled, variable speed, variable load engine. When running under full throttle at about three-fourths peak load speed, the Otto engine of the automobile type will easily develop 1 horsepower hour on 0.65 lb. of gasoline, but when developing only one-quarter

of its maximum power or less the fuel economy will be much lower. This is due partly to the fact that some of the mechanical losses are independent of the output, but chiefly to the fact that at low throttle the compression is low and hence the thermal conditions are unfavorable.

It may be that for the sake of fuel economy we eventually have to return to the constant speed, hit and miss-governed engine with all speed control obtained by the transmission. From the viewpoint of ease and flexibility of car control this would be a step backward, but if the fuel situation should become acute it might prove the lesser of two evils.

Truck Body Builder's Dimensions Should Be Standardized

IN the United States we have never had any standards of what might be called body builder's dimensions, for the reason that our passenger car manufacturers sell only complete cars and either manufacture the bodies themselves or have them made to their own designs. In Europe, where it has been customary for the automobile purchaser to buy his chassis and body separately, the need for "chassis" standards was felt at an early period, and standards were worked out jointly by the French Automobile Body Manufacturers' Association and the Automobile Manufacturers' Association. The French distinguish between voiturettes (cycle-cars), voitures legeres (light cars) and voitures de tourisme (touring cars) and for each of these classes the frame width, length behind dash, location of steering post, etc., are standardized.

In this country we have a similar situation in the truck field. With any except the lighest trucks it is uncommon for the manufacturers of the truck to furnish the body. This is left for the dealer to arrange for locally, and as there are no standards of body mounting dimensions the bodies must be practically built individually, which involves comparatively high cost.

There is a very obvious remedy for this situation, and it should be applied at once. The standardization of the "body builder's dimensions" should be left to the S. A. E. Standards Committee. Very likely the truck-body manufacturers are not represented in the S. A. E. to any extent, but this need be no bar to co-operation between the Standards Committee and either individual body builders or a committee representing the industry.

Perhaps no other step could be of more immediate advantage to the truck industry in this critical time than to put truck body production on a manufacturing basis, and the way to accomplish this is to standardize those dimensions of the chassis to which the body must fit.

Measurement of Grades

AT one of the sessions at the recent summer meeting of the Society of Automotive Engineers, the question was raised whether the draft due to grades should be taken as proportional to the sine or the tangent of the angle of the grade.

In railroad practice, the custom has been established of expressing the magnitude of a gradient in terms of the tangent of its angle. In other words, the per cent of the grade is found by dividing the vertical rise by the horizontal distance corresponding to the rise and then multiplying by 100.

It is perfectly legitimate to measure grades in this way but in calculating the increase in the draft of vehicles due to grades a mistake is frequently made. The fact is that it is generally assumed that the draft due to a grade of, say, 10 per cent is equal to 10 per cent of the weight of the vehicle. This would be true if the propelling force on the vehicle acted in a horizontal plane and the draft or resistance to motion, therefore, had to be considered also in a horizontal plane. But the propulsive effort on the vehicle is in the direction of the road surface or along the hypothenuse of the right angled triangle formed by the path of the vehicle and its horizontal and vertical components. In traveling a horizontal distance of 100 ft. on a 10 per cent grade the car is bodily lifted 10 ft.; and if its weight is, say, 2000 lb. the energy consumed in raising the car is 20,000 ft. lb. In developing this energy the car has moved over the road not 100 ft., but 100.5 ft., and the draft due to the grade, instead of being 200 lb., is only 199 lb., or one-half of one per cent less.

Within the limits of the grades used in railway work, the actual distance traveled by a train and the horizontal component thereof are so nearly alike that the error introduced by using the tangent instead of the sine for determining the draft due to grade is absolutely negligible. Even in the case of grades of the maximum order encountered in automobile traffic, the error introduced is quite small, as shown by the example given.

Centralization of Automobile Manufacture

THE prospect of the automobile manufacture becoming centralized in a few factories is often discussed. The typewriter and other manufactured articles of this sort are cited as examples. Recently one of the smaller passenger car manufacturers expressed a very decided opinion opposing this idea. He said in part:

"In the articles cited as examples in the argument for centralization of manufacture of motor cars, you will always note that the sole judgment passed upon the articles mentioned was mechanical excellence. With the passenger car there is another quality that is vital to sales—appearance. This is the feature that will enable the progressive, alert and original passenger car manufacturer to compete with the manufacturer who turns out the same patterns in large quantities. I believe there always will be a field for the manufacturer of this sort of a vehicle."

THE index for AUTOMOTIVE INDUSTRIES covering the first six months of 1920 is published as a separate pamphlet, not being included in a regular issue. Inquiries requesting a copy will be furnished one without delay.

Truck Industry Credit Ban Denied

Banks Not Striving to Help Railroads

No Conclusive Evidence of Move to Save Carriers from Competition

NEW YORK, Aug. 17—Everybody who makes or sells motor trucks is asking why it is so difficult to get credit for what almost everyone agrees is a most essential industry. Federal Reserve bankers who have arbitrarily classed passenger cars as luxuries agree unanimously that banks should lend every assistance possible to motor trucks at a time when the shortage of transportation is the most serious factor in industrial readjustment.

When it is admitted that motor trucks are essential, and any argument that they are not is banal, some manufacturers and dealers cannot see why they should not be given preference at the banks. It may be logical that they should but it is not being done. There is not much sentiment in banking these days. The man who can present a satisfactory statement of assets and liabilities is the one most likely to get the cash he is after.

There is no reason whatever, however, why the motor truck manufacturer or dealer who can give a bank a clean bill of financial health, should not get the accommodation to which he is entitled as a reputable business man. If the banker doesn't give it to him it means either that the bank has already loaned to the limit of its resources or that the banker doesn't know his business, and therefore has no place in his profession.

Still Harbor Edict Notion

There apparently are a lot of bankers in the country still laboring under the misapprehension that some Federal Reserve edict, official or unofficial, has gone forth against the acceptance of automobile paper of any kind. When a dealer or maker runs up against an individual of this type the only thing left to do is to educate him. If he can't be educated and shown the light, the only alternative is to leave him to his own fate and hunt up somebody else to do the financing. The reason for a large part of the credit troubles of the motor truck industry is that bankers haven't been sold on the fact that the truck is just as important an element of transportation as the railroad. In many cases it is even more important.

Within the past few days the report has become current in the industry that the railroads are responsible for the difficulty encountered in getting truck credit. Weight is lent to this story by the fact that field representatives of a large automobile financing company have reported to their headquarters here that in half a dozen instances they have been told by bankers upon whom they have called that nothing can be done for motor trucks because trucks are hurting the railroads. So far as can be learned, however, this is an isolated case.

Bankers in New York who are heavily interested in the automotive industry declare emphatically they do not believe there is a vestige of truth in any allegation that banks as a whole are inclined to help the carriers at the expense of motor trucks. Other financing companies make the same assertion.

A vice-president of one big bank deeply interested in the automotive industry, declared he would wager any amount that truck manufacturers were getting all the credit to which their financial statements entitled them. He said he believed they were being favored rather than the reverse. The same declaration came from the financing companies. They said they were even more ready to aid truck dealers than passenger car dealers. They are going as far in that direction as their own reduced lines of credit will let them.

AUTOMOTIVE INDUSTRIES a few weeks ago printed statements from a dozen or more railroad executives, in which they asserted they welcomed the assistance given the carriers by the motor truck as a feeder for their lines, and that they would shed no tears if motor trucks absorbed the lion's share of the short haul business, because the carriers never had found it profitable.

(*Continued on page* 389)

Trucks Save Warsaw

NEW YORK, Aug. 18—The capital of another nation has been saved by motor vehicles. This time it was Warsaw with double-decked motor buses. Here is what the Associated Press correspondent cabled about it from the beleaguered Polish city:

"WARSAW, Aug. 17—Double-deck automobile buses, similar to those in use on the Fifth Avenue line in New York City, helped save Warsaw from the Soviet menace. Just as taxicabs were used at the vital moment to save Paris in 1914 during the battle of the Marne, so the buses of Warsaw hauled troops to the front at the hour of this city's peril. The soldiers they carried were thrown into the foremost lines, where the danger was greatest."

Are motor trucks an essential means of transportation?

Manufacturers Push Truck Essentiality

Will Carry Request for Support as Important Transportation Agent to Banks

CHICAGO, Aug. 16—It appeared to be the opinion at a convention of the Motor Truck Manufacturers' Association, held at the Congress Hotel in this city, that the message of the motor truck as an essential agency in production and distribution should be brought very directly to the attention of the banker whose financial aid is needed to put the industry on a firm footing. The association went on record as indorsing the program of extensive advertising which has been inaugurated by the National Association of Motor Truck Sales Managers, and which has had the support of the local secretary of the association, David Thomas, and the truck manufacturers individually.

In bringing the matter to the attention of the banker it was decided emphasis should be laid on the fact that the people of the country had voted huge appropriations for the construction and improvement of highways, and that vehicular transportation must be provided to make these highways produce their full value.

The convention was one of a number of informal conferences to bring the members of the association together for discussing individual problems and of exchanging opinions that will aid the individual manufacturer in overcoming obstacles which another manufacturer may have met and overcome. The association intends to be a clearing-house of ideas through close co-operation.

Favor Uniform Vehicle Laws

Other than the question of bringing the matter of financing before the banker the association took up for consideration the subject of patents, different forms of insurance and the uniform vehicle law of which it is strongly in favor.

The association was formed about eighteen months ago, but has had headquarters here only for the last four months. It has 28 members, of whom ten were taken in at the convention just held. The officers are as follows: President, B. A. Gramm, of the Gramm-Bernstein Motor Truck Co.; vice-presidents, J. W. Stephenson, of the Indiana Truck Corp., and Frank Luick, of the Sterling Motor Truck Co.; secretary-treasurer, Moe Cook, of the Service Motor Truck Co. The directors, in addition to the officers, are R. C. Stewart, of the United States Motor Truck Co.; S. A. Cook, of the Diamond T Motor Car Co., and J. D. Potter, American Motor Truck Co.

Banks See Signs of Clearing Skies

Now Hopeful Danger Period Nearly Over

Factories Cutting Production—Turning Unbalanced Inventories into Cash

NEW YORK, Aug. 16—While there is nothing tangible upon which to base a more optimistic view of the future, there is evident in financial quarters a more hopeful tone. It seems to be psychological rather than practical, but it is shared by many men who have made careful and thoughtful studies of the situation. They believe that if the country can get over the next 60 days safely there will be no more real danger.

The better outlook is not based upon any expectation of a renewal of industrial activity, but rather the reverse. Bankers have hailed with gratification the gradual slowing down of manufacturing, and they expect this process to continue. It has been gradual and orderly thus far, and they believe it will continue to be. Temporary slackening of production is the only means they see to restore something like normal conditions within a comparatively few months.

Banks report a real falling off in demand for new money for commercial purposes, and this is regarded as a hopeful augury. This is attributed to a determination on the part of manufacturers to turn their present inventories into cash instead of going into the market for new supplies, except such as are necessary to complete their product. This has served to reduce the volume of their borrowings. As inventories are reduced it is not likely any present attempt will be made to continue production on a large scale.

Industry Regaining Firmness

Unbalanced inventories constitute one of the most menacing factors in the situation. There are legions of companies which have enormous inventories and very little cash. As fast as the raw materials are turned into finished product and sold, their technical condition improves. Automobile manufacturers were among the first to suffer from the inevitable readjustment, and they have been among the first to make a virtue of a necessity. Almost without exception that have cut their production materially and have effected production economies wherever possible.

The consequence of this wise move has been a steady strengthening of the position of the substantial companies. There have been several bankruptcies and receiverships, both of manufacturers and parts makers, but none has been large enough to cause more than a ripple. Creditors' committees are operating several other companies, but in most cases there is reason to believe they can be pulled through. There is apparent on the part of creditors a gratifying spirit of co-operation and an understanding that many concerns which are asking an extension of time on their bills are entirely solvent and their troubles are due solely to credit stringency and transportation difficulties. There is no disposition to force receiverships where there is the slightest hope the companies can be saved otherwise.

Road Service Improved

Improvement in the morale of railroad managers and workers has been evident since the increase in rates and wages were granted. They realize that private ownership is in the balance, and they are steaming up for a herculean effort to pull the roads out of the hole they are in by giving a greatly increased amount of transportation with the facilities at hand. Large orders have been placed already for new equipment and this will insure activity in steel mills, locomotive works and car building plants. These workers will possess large purchasing power in the districts in which they live, and these sections will be good potential markets.

The great crop raising districts are finding it difficult to be pessimistic in view of the bumper harvests. Their only concern is getting them to market. If the railroads can succeed in doing that they have no fear of the future. If the crops are moved these districts will be heavy purchasers of automobiles, trucks, tractors and other commodities.

Not the slightest doubt is felt by the leaders of the automobile industry that the future is secure. They know absolutely that the wonderful expansion which has marked the past ten years will continue for the next ten. This is true not only of passenger cars, but of trucks and tractors. There may be numerous failures before the present storm is over, but they can do no more than slow up the great machine for a little while. Nothing which will happen can permanently check its progress. It is too big and powerful to be seriously damaged. Automobiles are transportation, and if the industry of the world is to move there must be an abundance of transportation.

BRITISH OFFICERS ELECTED

LONDON, Aug. 2—(*Special Correspondence*)—A. S. Mays-Smith, head of the Delaunay-Belleville interests in England, has been elected president of the Society of Motor Manufacturers & Traders, Ltd., and Lieut-Col. J. A. Cole, Humber, Ltd., and S. D. Begbie, Aster Engineering Co., vice-presidents. H. M. Hobson was elected honorary treasurer.

Berliet Finances Cause Deep Concern

Company Lays Off 6000 Men—American Maker Reported Considering Purchase

PARIS, Aug. 7—(*Special Correspondence*)—The Berliet Co., of Lyons, one of the biggest of the French automobile manufacturing concerns, appears to be in serious difficulties. Definite information regarding the condition of the company is hard to get, for officials of the concern refuse to make any statement. Last April Berliet was producing 400 to 450 trucks a month, but his sales never exceeded 200 a month. Consequently big stocks were formed, and at the present time it is believed he has 1700 trucks on hand. About the middle of May truck sales in France almost ceased by reason of the saturation of the market with army stocks. In June 2000 workmen were laid off; up to the present date 6000 workmen or employees have been dismissed from the staff of 15,000.

Soon after the armistice Berliet laid plans for the production of a cheap four-passenger car. The design was a close copy of the Dodge, and as a consequence Dodge brought action against Berliet for infringement of patent rights, and has won its case. The new car, although exhibited at the Lyons Fair in March, 1919, is not yet in production.

Among the many reports circulated regarding the future of the company is one that Berliet is considering an offer to sell out to an American concern for 50 per cent of the value of the plant, finished cars and trucks, and raw material. Another report is that a Lorraine steel company is negotiating for the purchase, being interested in the Martin furnaces, which should have been in operation last November.

Is Disposed to Sell

It is understood that Marius Berliet, who started in the automobile business in 1889, with only three workmen and a capital of $900, is disposed to sell out, but insists on the continued use of his name in connection with a business which has been built up entirely by his own energy. The capital necessary to put the concern on a sound basis can be secured abroad, notwithstanding that $20,000,000 are needed. In financial circles there is considerable concern, for Berliet is now an incorporated company and a portion of the $10,000,000 capital is held by the public. In addition $5,000,000 6 per cent bonds were issued in 1918, and only a short time ago there was another issue of the same importance.

Detroit Production Reflects Conditions

Factories with Exception of Ford Show Considerable Decrease Under June

DETROIT, Aug. 14—The effect of the slowing up in demand, the financial stringency, transportation congestion and the general feeling of unrest, is shown in the production report for the Detroit district for July. Passenger car output fell off 13,962 and truck output 4475 as compared with June. The passenger car total for the month was 147,299 and trucks 15,468.

The total figures are not indicative of the true situation for the reason that the heavy production at the Ford factories alone prevented the total from being several thousand less. Ford in June produced 72,931 cars and 10,931 trucks. The Ford July report shows an output of 83,262 cars and 9251 trucks. All factories except Ford in June produced 88,330 cars while July records show a production of but 64,037, a decrease of 24,293. July truck production in all factories except Ford's show a decrease of 2795 compared with June figures.

Manufacturers are a unit in declaring that a steady demand for cars and trucks for the American market is certain to follow the lull. Slowing up in domestic demand has prompted efforts of manufacturers to increase the export shipments. Hudson Motor Car Co. shipped about 20 per cent of the July output overseas and Essex Motors export business amounted to about 33 1-3 per cent. Hupp Motor Car Company announced an increase in export business from 25 to 33 1-3 per cent of their output in July. Similar increases are shown all down the line and vigorous effort to overcome the slump by diversion of the product to foreign fields is being made.

Plants Maintain Schedules

The curtailment of the output necessarily has resulted in the laying off of many employees, but none of the factories, save the Commerce Motor Car Company, is down nor has there been any curtailment of the regular working schedules. On account of the cutting off of power it was feared factories might be forced to work half time, but all of them have installed emergency plants with gasoline engines and are working six days a week on regular schedules, some of them with night shifts.

The financial situation, according to bankers, has eased up, but the demand for money to move the crops is expected to be felt keenly by the automotive industry and that condition probably will last for sixty days.

The automobile dealers in the Detroit district have been busy with their bankers and as a result all of them are in position to finance their sales. Various methods have been resorted to and in all instances factories have co-operated with the dealers with the result that all dealer advertising informs the public that it will be taken care of in automobile purchases, on a reasonable credit basis. Conditions in Michigan do not reflect the general conditions.

The Willys-Overland factory, at Toledo, has let out about 2500 workers and this announcement was followed by the statement that the Bock Bearing Company plant would discontinue its night shift. The department affected by this order will be out of operation 90 days. Officials of the Bock plant declared there is a readjustment coming in the automotive industry, which takes all of the output of the Bock plant, necessitating the cutting off of the night shift to reduce the output.

Vice-President Earl, of Willys-Overland, said production had been hampered by failure to receive supplies. He said the policy of the factory in retaining married men during the slump would be continued and that production would continue on a curtailed schedule.

Willys Interests Buy United States Light

NEW YORK, Aug. 16—John N. Willys and his business associates have acquired control of the United States Light & Heat Corp., which manufactures storage batteries, an electric lighting and starting device for automobiles and electric lighting and heating devices for railroad cars, in a factory at Niagara Falls. Willys interests already controlled the Electric Auto-Lite Corp. of Toledo with which the Niagara Falls company was closely allied. For that reason the new addition to the chain of Willys enterprises will cause little surprise.

The new directorate of the United States Light & Heat Corp. is composed of the following: Willys, Walter P. Chrysler, J. R. Harbeck, J. E. Kepperley, J. Allan Smith, E. H. Gold, C. O. Miniger, C. L. Lane, James A. Roberts, J. O. Moore and George C. Shepard. The first four represent the Willys group. Willys has been elected chairman of the board, Gold vice-chairman and Smith president.

Foreclosed for Million in 1915

The United States Light & Heat Corp. is a reorganization of the United States Light & Heating Co., sold at foreclosure sale in 1915 for $1,000,000 to the stockholders protective committee. The original company was a consolidation of the Bliss Electric Car Lighting Co. of Milwaukee and the National Battery Co. of Buffalo. Its system of car lighting has been installed on more than 50 railroads. The capital of the Light & Heat Corp. is $7,000,000, of which $4,000,000 is common stock. Virtually all of the stock has been issued. It has a funded debt of $1,000,000.

The Electric Auto-Lite Corp. owns $1,050,000 of the stock of the United States Light & Heat Corp., $9,150,000 of the Willys-Overland Co. and $1,669,100 of the Fisk Rubber Co. and the Federal Rubber Co.

Indianapolis Plants Reduce Operations

Large Depletions of Working Forces Obtain in Most Factories for Present

INDIANAPOLIS, Aug. 16—Reduction in output in Indianapolis automobile plants has reached considerable proportions. Nearly all the factories have laid off men but the cuts are not nearly as large as reports have indicated.

The National plant has been virtually closed for the past fortnight, but began putting men at work again to-day. According to George M. Dickson, normal production will not be reached before April, however.

Stutz has laid off 200 employees out of 1000 and indicates that production may be still further reduced to protect dealers. It is added, however, that demand already is increasing in some sections of the country.

W. G. Todd, a director of the Monroe company, says there has been a 50 per cent lay-off, but that all the men will be taken back when reorganization and financing are completed.

The H. C. S. Co. announces that it will double its present production within ten days. It is said to have orders to cover a year's production.

Inventory is being taken at the Cole plant and only a few persons are working. It is said to be the company's policy to build only to meet actual demand.

Will H. Brown of the Nordyke-Marmon Co. says only 200 of a force of 5000 have been laid off, in spite of reports that 2000 workers have been dismissed temporarily. Brown added that the company merely was weeding out the inefficients hired during the rush season.

Premier is working with a reduced force and LaFayette has not been affected, its officials say.

RACINE TO BUILD DRY KILNS

RACINE, WIS., Aug. 16—Although an extensive building program projected earlier in the year by the Racine Mfg. Co., a subsidiary of the McCord Mfg. Co., has been curtailed to some extent, it is announced that work will start at once on the erection of a large battery of dry kilns and enlargement of the steam power plant by the addition of two new 300 hp. boilers at the works in Racine, Wis. The company is one of the largest makers of passenger car bodies in the Middle West.

ELLIS-SMITH UNDER HAMMER

ELMIRA, N. Y., Aug. 16—John J. Crowley, trustee in bankruptcy for the Ellis-Smith Mfg. Co., has been directed to sell the real estate, buildings and personal property of the company, at auction on Aug. 21 at the plant in this city. The claims filed against the property amount to $89,000, but the trustee and the court do not concede the liens claimed.

Banks Not Cutting Credits on Trucks

No Tendency Found to Retard Progress—Railway Magazine Would Check Cars

(*Continued from page* 386)

It would be unfair to accuse the executives of insincerity, and there is no reason to think they are. They are keen business men, and they realize that conditions have changed since the earlier days of the automotive industry when they were its avowed enemies. They know that it will be years before the carriers can hope to catch up with the business of the country. Some of them even are thinking seriously of going into the truck field themselves to feed their own lines.

Therefore if bankers who have invested in railroad securities feel they are serving their own interests by bucking the motor truck industry in the expectation that they will enhance the value of their investment, they simply have not kept up with the trend of modern business thought and are not as far-seeing as the men who are running the railroads.

An indication that some railroad interests are concerned over the competition of the automobile is found in an article in *Railway Age* which ingenuously remarks that while the increased rates granted the carriers will amount to about $75 a family a year, "the public can meet it without any increase in its total cost of living by the simple expedient of reducing its use of automobiles." This article seems to illustrate aptly the general attitude of the railroads and their partisans towards the automotive industry. Reduced to its simplest terms it is that anything which might compete with the railroads and thereby reduce their earning power should be suppressed. In its article *Railway Age* says:

"The amount it (the public) is now spending for automobile transportation throws much light on what it can afford to pay for railroad transportation.

Allege Cars for Comfort

"Railroad transportation is a necessity. This is especially true of freight transportation. Without it industry would speedily be paralyzed and the people brought to the verge of ruin and starvation. Most automobile transportation is not a necessity. Eighty-seven per cent of all the automobiles in service are passenger cars. The *Railway Age* has no disposition to criticize anybody who makes, or sells, or uses automobiles. but it is unquestionable that passenger automobiles are run chiefly for the comfort and pleasure of those who use them. The public would be greatly inconvenienced. but would not be brought to ruin and starvation if all passenger automobiles should quit running to-day.

"And yet, startling as the statement will be to most persons, the American public apparently has been for some time spending more for running and riding in automobiles than for all its railroad transportation—freight, passenger, express and mail combined. Statistics which the *Railway Age* has compiled indicate that the amount spent by the American public for automobile transportation in the year 1919 was almost $5,500,000,000. This was $300,000,000 more than it paid in rates for railroad transportation. It was almost the same as the total amount the public paid for railroad transportation, including the deficit incurred by the Government. In the year 1920, as near as we have been able to estimate, the American people will spend for running and riding in automobiles over $6,020,000,000.

Compares Service and Cost

"These estimates, however, include nothing for expenditures made by the public for the construction and maintenance of highways for the automobiles to run on. Nor do they include anything for the economic cost of automobile accidents. If data regarding these points were available they probably would disclose the astonishing fact that even after the advance of $1,580,000,000 in railway rates has been made the American public will be spending as much for its automobile transportation, most of which is a luxury, as for its railroad transportation, most of which is a necessity.

"When the critics of the advances in railway rates and the advocates of Government ownership talk about the American public not being able to stand a railroad 'tax' of about $350 per family, the question naturally arises as to how they account for the fact that the American public is able to and does voluntarily pay over $280 per family for using automobiles. As already indicated, the increase in railway rates which has just been granted will amount to about $75 per family. The public can meet it without any increase in its total cost of living by the simple expedient of reducing its use of automobiles."

NEW PREST-O-LITE ON MARKET

NEW YORK, Aug. 16—The Prest-O-Lite Co. is distributing a new type of dry shipped storage battery. Unlike the older type known as the Prest-O-Lite "Green Seal," this new type is completely assembled, and all that is necessary to put it to work is the addition of electrolyte of the proper density and the following out of directions for the development cycle as listed on the new card.

In order to differentiate for the present between the old type and the new, the latter will be called the Assembled Green Seal, the older type being termed the Partly Assembled Green Seal.

FRANKLIN BUYS BODY SHARE

AMESBURY, MASS., Aug. 16.—The Walker Wells Co., one of the largest manufacturers of automobile bodies in the East, has been reorganized. The H. H. Franklin Mfg. Co. has purchased the interests of the late Harlan P. Wells, and from now on it will be known as the Walker Body Company.

U. S. Chamber Finds Saturation Distant

Review of Business for July Finds Present Production Peak Probably Reached

WASHINGTON, Aug. 16—The committee on statistics and standards of the United States Chamber of Commerce in a review of business conditions for July points out that "any complete point of 'saturation' in automobiles does not seem imminent—rather in a moderate way, a readjustment which has long been looked for." It is the opinion of these officials that the industry gives indication of approaching the peak of production for the present. They believe that business will boom for sales agencies and garages.

According to the Chamber of Commerce, "not only will there be a demand for replacement but also for new purchases, for we are fast realizing that automobiles are a necessary and inalienable factor in modern civilization. Any talk of their being luxuries and unessentials is rather unknowing and foolish. There was once the same talk about telephones and telegraph. Outside the definite part which automobiles play in business, and which steadily grows in importance, they have done more to broaden the understanding and mental horizon of their users than any invention within a generation.

"In especial they have been a boon, beyond comparison, to the dweller on the countryside—on the farm and in the small town."

CONSOLIDATE HARE'S SALES

PHILADELPHIA, PA., Aug. 17—Beginning to-day the Philadelphia branch of the Locomobile company begins the distribution of the Mercer in addition to the Locomobile in eastern Pennsylvania, southern New Jersey, and all of Delaware. This centralizes the merchandising of all the products of Hare's Motors in this territory. The Philadelphia branch is under the management of Oscar Coolican, former manager of the Detroit branch of Packard Motor Car Co. Plans to consolidate sales in all territories are progressing.

AIR SERVICE TO CROSS CANADA

OTTAWA, Aug. 17—A transcontinental air route, with express airplanes offering fifty-hour service between Halifax and Vancouver, will be established soon by the Canadian Air Board.

Utilizing seaplanes for the eastern portion of the route and land machines for the west, where water landings are said to be impossible, the air line will offer complete passenger, express, mail and light freight service.

Control stations are to be established at intervals of twenty miles, with air ports at all principal cities along the route.

Motor Truck Army Keeps Steel Moving

Carries 22,000 Tons in Day in Youngstown District to Railroad Yards

YOUNGSTOWN, Aug. 16—The motor truck is the "taxicab army" standing between the steel industry of the Mahoning valley and the long struggle against industrial and rail conditions that have threatened suspension of operations. The Mahoning valley mills produce enormous quantities of automobile steel.

The motor truck for the last thirty days has been the agency that has enabled the mills to continue operations. Twenty-two thousand tons of automobile steel were moved in one day from a Youngstown mill to a railroad switch track for loading. It was moved by motor trucks a distance of more than a mile through the streets of the city. Without them this tonnage would have waited the service of a crippled switching service to handle the steel from the mill yards to the railroad.

Special arrangements have been necessary to take care of the great number of trucks that are moving steel. There have been days recently when 70 to 100 trucks have been waiting their turn to pull up to the loading points.

Steel men here believe that if conditions are similar elsewhere, the automobile business has been enabled to proceed, with a curtailed production, only by virtue of the truck making it possible for the mills to continue operations. Not all of the finished product moved by the trucks is automobile material. But the movement of any considerable amount of rough or finished product from any department of the mills aids operations in general.

Northern Africa Open for Automotive Sales

NEW YORK, Aug. 17—Ernest A. DeLorenzi, European traveling representative of the John Willys Export Corp., has resigned and returned to the United States. Early in the year DeLorenzi made an extensive investigating trip across Northern Africa through Morocco, Algeria and Tunis, and reports conditions especially good in these countries due to the high prices that agricultural commodities have brought.

Good progress is being made in the sole of motor apparatus including cars, trucks, and farm tractors. Tunis has a good system of roads in the northern part of the country. The system in Algeria is not so good although the country has approximately 2800 miles of macadam roads. In Morocco roads are in a poor condition. Motor truck transportation companies are being organized in Tunis, one concern having placed an order for several hundred European trucks.

In the British Isles the recent tax of £1 per horsepower on motor cars has slowed sales very much and has hit the purchasers of low-priced cars in particular where the rated horsepower is between 20 and 25. Most of these cars have an annual mileage of a little over 5000 miles, and the present tax of £1 per horsepower which recently took the place of the gasoline tax is much heavier to bear where mileages per year are low.

The tax favors the large high-priced cars which have a greater mileage during the year and the gasoline consumption of which is higher. In some of the high-priced machines the saving in gasoline will more than equal the horsepower tax, so that the change in tax is an economy, whereas with the low-priced cars with smaller mileage the horsepower tax is a much greater burden.

Monroe Changes Sales to Get Quicker Returns

INDIANAPOLIS, Aug. 16—The Monroe Motors Corp. has been organized to take over the Indiana distribution of Monroe automobiles manufactured by the William Small Co. of this city. The new company will succeed the Monroe Sales Co., which was part of the William Small Co. It will not be connected with the Small company as was the old concern. It is understood that the new arrangement will enable the manufacturing company to realize on its sales in this territory more quickly than has been the case.

Midwest Workers Take Shares of New Stock

INDIANAPOLIS, Aug. 16—Employees of the Midwest Engine Co. have purchased $128,000 of the company's preferred stock, according to John A. Wood, president of the company. The company recently increased its capital stock to $8,000,000 and is planning a general expansion of its business. The production of utilitors, a farm power unit, truck and tractor engines and marine and pump equipment will be materially increased. Carl Fisher and James Allison, formerly of the Prest-O-Lite Co., and officials of the Indianapolis Motor Speedway have each purchased $1,000,000 stock in the reorganized Midwest company. More than one-third of the employees subscribed to the stock issue.

MARTIN ENLARGES FACTORY

MILWAUKEE, Aug. 16—The A. E. Martin Foundry Co., one of the largest makers in America of cylinder and piston castings exclusively, has completed a large works addition and is breaking ground for further extensions, consisting of a foundry addition, 35 x 150 ft., and a new core-room, 100 x 100 ft. This will bring up the output to from 35 to 40 tons a day, compared with the present capacity of 25 to 30 tons daily. A specialty is made of air-cooled cylinders. A. E. Martin is president and general manager.

New York Abandons Tractor Showings

Ruling by N. I. V. A. Causes Department of Agriculture to Forego Demonstrations

ITHACA, N. Y., Aug. 16—New York State tractor demonstrations, which have been made during the past year, some of the most comprehensive in the country, have been abandoned for this year. The State Department of Agriculture which has conducted the demonstrations in co-operation with the Department of Rural Engineering of the New York State College of Agriculture has given up the demonstration plan which covered several separate exhibits for this year because of the ruling of the National Implement and Vehicle Association putting the ban on demonstrations of more than one day's duration and of a nature other than purely local. The demonstrations have been given on the face of this ruling despite the desire of farmers of the state that they be held and the personal willingness of tractor branch managers to participate.

The National Association's new rule imposes a penalty on any of its members which participate in a demonstration for a longer time than one day or in one which covers an area greater than that which is normally tributary to the local dealer.

The penalty bars the offending member from participation in any of the several National Tractor shows to be held this year under the auspices of the association in several sections of the country, in place of the former single so-called National show formerly held at Wichita, Kans.

The New York demonstrations have usually been held in 3 or 4 widely separated sections of the state, and have covered 2 days each. Funds have already been appropriated for this year's work.

DEFINES TRUCK LOAD LAW

NEW YORK, Aug. 14—The Trailer Manufacturers Association has obtained from Secretary of State Hugo an interpretation of the Ferris law, enacted at the last session of the Legislature, relating to trucks and trailers. Under the law the combined weight or truck and load or trailer and load is limited to 25,000 lb., the "load to be so distributed that there shall not be more than 800 pounds per inch in width of tire on any one wheel."

In reply to its request for a definition of the law, Secretary Hugo wrote:

"I have to advise that 800 lb. per inch in width of tire will be taken as the limiting factor for the weight of the trailer."

This is taken to mean that the semi-trailer combination with load may weigh more than 25,000 lb. so long as the truck or tractor alone, plus its rated carrying capacity, does not exceed 25,000 lb. and the weight on the trailer wheels is not more than 800 lb. per inch of tire width.

Appraisers Define Steel Frame Tariff

Placed Under Metal Manufactures with 20 Per Cent Ad Valorem Rate

WASHINGTON, Aug. 16—Decision of the Board of General Appraisers as announced here, that steel frames for automobile bodies are not dutiable, may have a stimulating effect on the importation of these articles. The decision of the collector at the port of Detroit classifying the merchandise is accordingly reversed.

The board ruled in the matter of the protest of John V. Carr, an importer, against the assessment of duty by the Detroit collector. The question concerned steel frames for automobiles assessed for duty at 45 per cent under paragraph 119 as automobile bodies, and claimed to be dutiable at the 15 per cent rate as manufactures of wood not specially provided for. Seven witnesses, mostly officials of the Dort Motor Car Co., were called by the importer to sustain his claim that these articles are merely the frames of automobile bodies, which require considerable further manufacturing processes before the trade would recognize or accept them as automobile bodies. This contention was formally recognized by the board.

The board describes steel frames for automobile bodies and holds them assessed as follows: "Frames which enter into the construction of automobile bodies; that, being composed in chief value of steel not plated with gold or silver, they are properly dutiable at the rate of 20 per cent ad valorem under paragraph 167 of the act of 1913 as manufactures of metal not specially provided for."

FRANCE COLOMBIAN TEACHER

WASHINGTON, Aug. 13—French aircraft manufacturers were awarded the contract for the establishment of an aviation school for the Colombian army, according to a cablegram to the State Department to-day. The American consul advised that the material used will be imported from Europe. The contract with a Swiss military mission has been canceled. Five French army officers will instruct Colombian cadets in aeronautics.

The State Department was also notified that commercial and civilian aeronautical activities in Siam remain as yet entirely undeveloped.

HANSON NAMES DISTRIBUTERS

ATLANTA, GA., Aug. 14—After having been engaged in organization work and the development of a plant since 1917, the Hanson Motor Co. is now in position to produce 25 cars a day and is at present turning out 12. Until now its output has been absorbed mainly in the south, but it now plans to establish a national distribution. The Allen-Waring Co. in New York, Gordon Motors Co. in Philadelphia and the Hanson Sales Co. in Baltimore have recently taken distributing agencies. An order for 150 cars has just been received for South America.

The car sells for $2,165 and one of its features is the large amount of aluminum that is used. O. R. Randall, formerly of the Case company, who joined the Hanson company in March as assistant secretary-treasurer, states that 37 acres have been secured adjacent to the factory and will be used for home building as soon as building conditions improve. A dividend of 4 per cent on the common was paid for the first six months and the 6 per cent due for the year on the preferred has also been passed on to the stockholders.

Dividends of 4 per cent on the common stock and 6 per cent on the preferred stock have been voted by the directors of the Hanson company. At a recent annual meeting of stockholders it was reported the company's assets now are almost $1,250,000, with liabilities about one-fourth this amount.

Moline to Take Over R. & V. Engine Business

MOLINE, ILL., Aug. 16—Announcement is expected soon of completion of negotiations for the sale of the automotive engineering business of Root & Van Dervoort to the Moline Plow Co., which has been taking about 80 per cent of the output of Root & Van Dervoort engines for its tractors and its Stephens Six automobile.

It is probable that holders of present Root & Van Dervoort stock will receive from Moline Plow Co., in return for the sale of the automotive engine business, a special preferred stock, ranking after the present Moline Plow preferred but before the common stock, which will have some special protective features, a redemption value above the book value of the assets transferred and which Moline Plow expects to redeem in whole in six or seven years, and a portion of which will be annually retired. It is likely that the stock will pay $2.50 per share in dividends, and will be exchanged share for share for present Root & Van Dervoort stock. Moline Plow Co. assumes the 8 per cent preferred stock of the R. & V. Engineering Co.

A new company will be formed from the remaining assets for the benefit of R. & V. shareholders to continue the manufacture of the Root & Van Dervoort Knight-engined automobiles. The six-cylinder car will be continued and a new four-cylinder Knight product, now under test, will shortly be marketed.

TO MAKE STEAM CURING BAG

DENVER, Aug. 14—The Steam Bag Corp. has been formed to manufacture a steam curing bag for rubber vulcanizing. A large size has been perfected for curing pneumatic truck tires. The officers of the corporation are: E. W. Ohls, president and treasurer; C. F. Miller, vice-president and general manager; W. L. Heinig, secretary; T. E. Stephenson, assistant secretary, and M. A. Johnson, service and factory manager.

Mexico to Employ Army on Highways

Provisional Government Plans System Connecting All Parts of Republic with Capital

NEW ORLEANS, Aug. 16—The new Mexican government has advertised for bids for the construction of 400 miles of broken rock, concrete-surfaced road, connecting the capital, Mexico City, with Guadalajara, the second city in size in the republic, and capital of the state of Jalisco, lying to the west of Mexico City. This is the first step in the plan of Provisional President de la Huerta to connect the principal cities of the republic with the capital by modern, all-year highways. Mexico City is now connected with Cuernavaca, capital of the state of Morelos, 70 miles over the mountains, by a road 80 to 100 feet wide, hard-surfaced over a cobble-stone road laid by the Spanish conquerors in the sixteenth century.

Other cities to be connected with Mexico City by hard-surfaced highways, according to an official bulletin received here from Mexico City, are Puebla, Tampico, Vera Cruz, Chihuahua, Monterey, Tehuantepec and Zacatecas. "Nothing will promote pacification of the entire republic and bring the people of all parts of Mexico into so close communion, commercially, socially and politically, as a nation-wide system of good roads," says this government bulletin. A percentage of the new severance tax, recently levied on all productions of the natural resources of the state, will be devoted to the construction and maintenance of these government roads, which will be built under direction of army engineers, and on which labor will be provided for the next ten years for the demobilized men of the various forces which have been under arms in the republic for the past decade.

When the road to Guadalajara is completed—the first one to be built—it will be continued as rapidly as possible to Colima, capital of the west coast state of the same name, and thence to the port of Manzanillo, on the Pacific side, where the government is expending $10,000,000 gold in harbor improvements and port works.

A. S. M. E. FORMS NEW SECTION

NEW YORK, Aug. 16—The Materials Handling Section of the American Society of Mechanical Engineers was organized at the Engineering Societies Building Friday. The program for this section, which was organized in response to a petition of 301 firms, was stated as follows:

First, to study the entire field and determine the underlying principles of materials handling; second, to systematize the responsibility of handling so that the actual work of handling may be expedited. F. E. Lister, N. J. Penning and H. E. Whitaker are the nominating committee.

Special Cables

French Dealers Buy 12,000 Cars in Camp

Government Turns Over Store of Vehicles for Repair and Retail Disposition

(*By Cable to* AUTOMOTIVE INDUSTRIES)

PARIS, Aug. 16—The American automobile camp at Bourges, where 12,000 American cars of various makes have been stored since the armistice, has been sold to a French company, which will retail the machines after repairing them. This is the first sale by the French government of a complete camp. The system followed up to the present has been to sell single automobiles to individuals. It is reported negotiations are under way for the sale of other American camps at Verneuil, Is-sur-Tille and Romorantin. As a result of this change of policy, Colonel Le Charier, director of automobile liquidations has been relieved from that service.

The French Government report on hydro-electric power indicates that 9,000,000 hp. is available in this country. At the present time 1,165,000 hp. is in use and work under way will develop 500,000 hp. more. Another 3,000,000 hp. can be obtained within 15 years, leaving 4,000,000 hp. for development at a later date. The work of generating electricity by water power is being pushed rapidly to meet the shortage of coal. A similar movement already is under way in Italy. The Fiat company has announced that within a couple years all their works and steel furnaces will be operated by electricity obtained from the Alps.

Miss America, the hydroplane boat built by Smith brothers of Algonac, Mich., carrying two Liberty engines, won the British international motorboat contest at Cowes, capturing the trophy for the United States. In her first start, Miss Detroit finished fourth, having been slowed up by spark plug trouble. In the second race, American boats finished first and second. The victory was an easy one, for the American boats were much superior to their British competitors. Owing to spark plug trouble, however, they were not able to develop their highest speeds. The average speed the first day was 51½ knots and the second day 53½ knots.

BRADLEY.

EUROPE MAIL PLANES EXTENDED

NEW YORK, Aug. 14—Advices from The Hague state that the regular air mail between London and Amsterdam is about to be extended to a whole network of mail services in northern Europe, so that it will be possible to start from the London aerodrome at 4 o'clock in the afternoon, spend the night in Amsterdam and start the following morning at 7 o'clock for Bremen, Hamburg and Copenhagen. Alternative routes can be taken by changing at Hamburg for Berlin by airplane or for Warnemunde and Malmoe by hydroplane, making train connection for Stockholm and Christiania.

While the Airco machines are being used for the London-Amsterdam and Hamburg-Copenhagen routes, the German Luftverkehr Gesellschaft is providing machines for the remaining routes.

All these aerial services will continue until October.

The King Buys an Austin Tractor

LONDON, Aug. 2 (*Special Correspondence*) — An Austin farm tractor has just been purchased by Major Ramsay, acting on behalf of H. M. the King. This will be used on the royal estates in Scotland.

His Majesty has always taken a deep interest in farming and has had many opportunities of witnessing the best agricultural methods in parts of the kingdom so widely divided and diversely situated as the estates of the Duchy of Cornwall, Sandringham and his Scottish property at Balmoral.

The present purchase of an Austin tractor shows how keenly His Majesty is following the trend of progress in regard to mechanical aids in farming, and will give fresh encouragement to all who are interested in the land.

Fuel Committee Urges Greater Use of Coal

LONDON, Aug. 2 (*Special Correspondence*)—The American Chamber of Commerce in London understands that the British Fuel Research Committee, appointed to investigate alternative fuels for petrol, has reported that the production of power alcohol from foodstuffs is not economically possible in Great Britain and that production in other parts of the Empire on an adequate scale is not yet practicable.

The committee emphasizes the fact that since the world's output of petroleum is only about 75,000,000 tons, whilst coal is in the region of about 15,000,000,000 tons a year, there is no alternative at present, except to concentrate all energies on the adoption of the products of coal, since coal is the largest as well as the cheapest source of fuel for transport purposes.

The production of vegetable materials in Great Britain from which alcohol could be extracted is not sufficiently high to allow of their use for purposes other than foodstuffs, whilst the production of alcohol in other parts of the Empire where vegetation is plentiful will depend on a cheap and simple process on the spot, which does not yet exist.

Austin Drops Plan to Increase Stock

Fall in Existing Shares on Stock Market Withholds Proposed New Issues

LONDON, Aug. 9—(*Special Correspondence*)—Sir Herbert Austin, at a meeting this week of some 250 of the largest stockholders of the Austin Motor Co., was optimistic of the company's future, and attributed the heavy fall in the company's stock to the circulation of unfavorable and baseless rumors as to the company's position. Orders on the books on which deposits had been paid total $65,000,000, while the next year's turnover in spares and replacements is estimated at $5,000,000.

The schedule of output had been exceeded in some cases (it is reported now to be nearly 300 chassis weekly), while as regards profits he estimated that they should amount to $2,500,000 per annum, which after paying the interest on the preference and preferred issues should leave "a suitable dividend" on the ordinary share capital for the current year. A proposed new issue of shares had been abandoned because of the fall in the existing shares, but he considered that the company's business warranted $7,500,000 more capital. Austin 10 per cent preferred ordinary stock recovered to $2.25 from $1.66, but has since fallen to $2. Austins, however, are by no means alone in "slumping," the recent Rover flotation having left the underwriters with a large portion of the issue on their hands, with the result that the company's ordinary stock slightly dropped. Apparently Rover's wants the capital to develop the output of its new (Olympia Show) light car, which is listed at $3000.

CONNECTICUT COMPANY SUES

NEW YORK, Aug. 16—Suit has been brought in United States District Court by the Connecticut Telephone & Electric Co. of Meriden, Conn., against the Automotive Specialty Co. of New York for alleged infringement of patents covering the Connecticut interrupter and timer and other ignition devices made by the company. The suit follows closely recent successful prosecutions by the same company against Paul G. Niehoff & Co. and Joseph Weidenhoff, both of Chicago. It is alleged that "pirate" parts have been used with Connecticut ignition systems.

CHICAGO GETS BALLOON RACES

NEW YORK, Aug. 16—The national and international balloon races which were scheduled to take place at Indianapolis on Sept. 11 and Oct. 23, respectively, have been transferred to Chicago, where they will be held on the same dates, according to an announcement by the Contest Committee of the Aero Club of America. Inability to obtain gas to fill the balloons at Indianapolis was given as the reason for the change.

Electric Lines Ask Curb on Buses

Regulation Sought As Public Carriers

Commission, in Report to President Wilson, Says Competition Threatens Railway Solvency

WASHINGTON, Aug. 18—Sweeping measures to curb the operation of motor vehicles and thereby help electric lines which are facing bankruptcy because of the more satisfactory service given by jitneys and motor buses, are recommended in the report of the Federal Electric Railways Commission submitted to President Wilson to-day. The commission proposes that because the great increase in the use of motor vehicles "has introduced a serious, although not a fatal, competition to the electric railways, they should be subject to regulatory provisions as public carriers."

Exception is taken by the commission, headed by Charles E. Elmquist, president and general solicitor of the National Association of Railway and Utilities Commissioners, to "the untrammeled freedom from taxation, maintenance of highways and financial responsibility for accidents" which the motor operators enjoy. The electric carriers protest against the discriminatory practices of the jitneys which have taken much of a profitable short haul traffic in certain cities. The real nub of the whole opposition to motor competition is found in the following excerpt from the Federal report:

"If jitneys and automobile buses acting as common carriers were subject to regulations by State commissions and were required to procure a certificate of public convenience and necessity before establishing a route or undertaking to render public service, the motor vehicles would be prevented from entering into active competition with a street car service unless the latter is shown to be wholly inadequate.

Give Supplementary Service

"That street railway service and jitney service cannot permanently exist and to pay their own way in competition with each other under any ordinary urban conditions seems to be well established by experience and by the conditions inherent in local transportation service, but the belief is general that the motor bus may properly be used to supplement the service rendered by the street cars.

"The motor bus may be used to render a sort of supplementary service, such as the service now rendered on Fifth Avenue and certain high-grade residential streets in New York City by the Fifth Avenue Coach Co., or the buses may be operated on other independent routes merely as feeders to the street railway system to take care of traffic in partially developed territory in advance of the time when street railway tracks can be laid with reasonable assurance that the investment will be self sustaining.

"Undoubtedly, the whole matter of the control or abolishment of jitney competition may be summed up in a few words. All transportation service is for the public. Jitneys and automobile buses cannot be repressed merely for the sake of compelling people to ride on the street cars, particularly if the carfares are higher than the jitney fares and the car service less convenient than the jitney service. However, it is clearly in the public interest that all common carriers engaged in local transportation service should be required to render adequate and safe service, and that local transportation facilities should be developed in the most economical and effective way from the viewpoint of the community.

Problem a Local One

"Unnecessary and destructive competition ought not to be permitted, and the community at large should conserve the established facility that still is and promises to continue for an indefinite period the principal means of local transportation. The problem in a considerable measure is a local one, but in every case it should be solved with intelligent regard to the permanent interests and obligations of the community.

"If the street railways are to be allowed the benefits of even a qualified monopoly, they should be required to fulfill their obligations. They must render service that is adequate and convenient at rates that are attractive. The community can afford to go a long way to preserve street railway service."

In discussing the financial situation of the electric railway industry, the commission stressed the conclusion, "the experience of numerous communities, even before the extraordinary conditions growing out of the war, made it clear that unrestricted jitney operation, though more or less temporary in character, threatens the service, credit and solvency of the street railways."

Can't Limit Private Cars

After careful investigation and long deliberation the commission reached the conclusion that while private automobiles undoubtedly have cut into the profits of street railways, "they are even now less important than human legs as a competitor of the electric railways and it is not deemed consonant with the theory of American institutions and government that the free movement of private citizens by their own means of locomotion should be restricted in order to compel them to make use of public vehicles, whether the latter be operated by private agencies or by the Government."

Chrysler Inspects Maxwell Properties

Holds Conferences with President Mitchell—No General Manager Appointment Yet

DETROIT, Aug. 19—Walter P. Chrysler, general manager for John N. Willys, who has been delegated to head the management committee in charge of the Maxwell-Chalmers interests, has been here since Tuesday inspecting the plants and holding conferences with President Mitchell of the Maxwell company as well as other officers. He said to-day he was not quite ready to make an announcement of a new general manager if one is named to succeed C. C. Hanch.

Reports persist that Charles Adams, the Maxwell production manager, may be appointed to the post. Hanch has a contract with the company which has some time to run and it is intimated that he will accept no post with the company other than the one he now holds. Adams was with Walter Flanders at the old Ford plant and then was production manager of the E. M. F. combination. From there he went to the old Everitt plant and has been with Maxwell since it started.

$15,000,000 Needed for Merger

NEW YORK, Aug. 19—Conferences concerning the permanent financing of the Maxwell and Chalmers companies are proceeding and several meetings have been held in the last week. It is proposed to provide enough money to put the combination in a strong financial position and this sum has been fixed tentatively at $15,000,000. Arrangements will be made under which the present revolving fund of $12,500,000 provided by the banks will be retired.

DUNLOP INCREASES CAPITAL

NEW YORK, Aug. 19—Reports have reached New York that the Dunlop Rubber Co. of England has declared a 10 per cent stock dividend and has increased its capital from 4,500,000 pounds sterling to 15,000,000 pounds sterling.

NEW CHICAGO AIR LINE

CHICAGO, Aug. 16—Another link in the chain connecting Chicago with other western cities by air mail service was forged to-day with the inaugurating of a service to Minneapolis.

FRANKLIN ON 4-DAY BASIS

SYRACUSE, Aug. 18—The H. H. Franklin Automobile Mfg. Co. has put its plant on a 4-day-a-week working schedule. Curtailed orders are said to be the cause.

G. M. C. Surplus Totals $32,504,664 for Half

Earnings Equal $1.66 a Share on New Stock—Quarter Profits About Even

NEW YORK, Aug. 16—The report of General Motors Corp. for the six months ended June 30 last, shows a surplus of $32,504,664, equal to $1.66 a share on the 19,518,895 shares of no par value common stock, as compared with a surplus of $29,125,942, or $19.72 on $147,647,700 common stock in 1919. The surplus remains after a payment of charges, Federal taxes, preferred and debenture dividends. The income statement for the six months compares with those of the same periods in 1919 as follows:

	1920	1919
Net profits	*$56,251,236	$48,900 800
Fed. tax and ext. exp.	20,741,880	17,706,636
Surplus	$35,509,356	$31,194,164
G. M. prop. thereof	$35,151,114	$30,591,987
Preferred dividends	485,111	522 392
Debenture dividends	2,161,339	943,653
Surplus	$32,504,664	$29,125,942

*After expenses, ordinary taxes, depreciation.

A comparison of the March quarter earnings with the June quarter (which was compiled by deducting the company's March quarterly report from the six months report) shows as follows:

	June Quarter	March Quarter
Net profits	$28,170,070	$28,081,166*
Fed. tax, exp., etc.	12,415 230	8,326,650*
Balance	$15,754,840	$19,754,516†
G. M. prop. thereof	$15,547,709	$19,603 405†
Debenture dividends	1,300.355	860,984*
Preferred dividends	242,823	242,288*
Surplus	$14,004,531	$18,500,133†

*Increase. †Decrease.

PONTIAC HOUSING COMPLETED

FLINT, MICH., Aug. 16—A. J. Saville, who has completed the work of housing construction for the Dupont Engineering Co., was the guest of honor at a reception here last week. In a short talk at the reception, Saville told of the work that had been accomplished, including the building of 950 houses, six miles of storm water sewers and 22 miles of water and gas mains. The completion of the housing program has relieved the congestion. Pontiac and automobile factory workers now are housed in substantial structures, whereas for a time they were compelled to live in shacks and tents.

SOUTHEAST BUSY ON ROADS

ATLANTA, Aug. 16—According to a recent announcement made by the Bureau of Public Roads at Montgomery, Ala., Georgia leads the six Southeastern states in the amount of good road work that has been approved by the Federal Government and is due to receive government financial aid. One-half of the cost of all road work approved by the Bureau of Public Roads of the Montgomery district, which includes the states of Alabama, Georgia, Florida, Mississippi, South Carolina and Tennessee, will be paid for by the government.

Georgia leads in this district with $5,776,240. Tennessee and Mississippi are second and third.

Projects already under construction in the district represent an outlay of $2,466,775, not including work already completed, Georgia again ranking first, with $1,130,437, with Alabama and South Carolina second and third.

Republic Holds Off Pneumatic Production

YOUNGSTOWN, OHIO, Aug. 16—"In keeping with the experience of the rubber trade generally, our sales dropped off very greatly during April, built up somewhat during May and toward the end of June were about normal," says E. F. Jones, president of the Republic Rubber Corp., in announcement of a balance sheet, as of June 30.

The Republic plants shut down June 30 to reduce excessive inventories caused by the slackening of trade, largely due to the nation-wide impression that the Federal Reserve system had restricted rediscounting of automobile paper. This is the chief cause ascribed by the Republic officials. In the meantime operations in the solid tire and mechanical goods departments have been resumed.

At present the Republic is on 35 per cent production, running exclusively on materials for which orders are in hand. It will be another month before the plant resumes manufacture of pneumatic tires and inner tubes. President Jones says it is impossible to give any definite indication of when the company will resume dividends.

The balance sheet is as follows:

Assets

Current:		
Cash on hand and on deposit	$243,543.94	
Notes, acceptances and accounts receivable after allowance for discounts, doubtful, etc.	2,520,543.41	
Inventory on hand and in transit, at cost	8,972,456.09	
		$11,736,543.44
Other Assets:		
Miscellaneous accounts and investments after allowance for shrinkage		452,517.44
Property, plant and equipment after allowance for depreciation and obsolescence		4,881 582.55
Patents		2.00
Prepaid items		111.609.86
		$17,182,255 29

Liabilities

Current:		
Notes, acceptances and accounts payable	$6.349,212.20	
Accrued liabilities	94,779 69	
		$6 443,991.89
Other liabilities		17 060.00
Miscellaneous reserves		71,195 07
Net worth		10 650,098 33
		$17,182,255 29

Big Interests Join in Another Merger

Willys, American Can and Maxwell Linked in Body Plant Deal

NEW YORK, Aug. 19—Cumulative evidence of a close relationship between the interests of the American Can Co., John N. Willys and Maxwell-Chalmers, is found in the authoritative report that representatives of all three will be identified with the American Motor Body Mfg. Corp., which will be a consolidation of the Hale & Kilburn Corp. and the Wadsworth Mfg. Co. of Detroit. The Chase Securities Corp. is expected to head a syndicate which will bring out the securities of the new company. The Chase Securities Corp. is a subsidiary of the Chase National Bank, which has representatives on the Willys and Maxwell directorates, Bethlehem Motors Corp. and other automotive enterprises.

Rumors have been rife for weeks in financial circles that the present situation in the automobile industry would result in still further combines and consolidations. Color was first lent to this report when Walter P. Chrysler, right hand man for Willys, and John R. Harbeck, vice-president of the American Can Co., also heavily interested in the Willys companies, were entrusted with a large part of the responsibility for the reorganization and consolidation of the Maxwell and Chalmers companies. It was formally denied at that time, however, that there was any significance in their appointment on the management committee.

Stockholders of the Hale & Kilburn Company have been informed a proposition has been submitted to the directors for a combination with the Wadsworth company under the name of the American Motor Body Corp. Voting control of the new company would be vested in voting trustees, two-thirds of whom would be named by the American Can Co. Edward G. Budd would be president of the merged companies.

ACE IN CREDITORS HANDS

PHILADELPHIA, Aug. 19—The affairs of the Ace Motors Corp. are in the hands of a creditors committee. Troubles of the company are ascribed to transportation difficulties and the short money situation.

WASHINGTON TO AID AIRCRAFT

SEATTLE, Aug. 16—One of the first moves toward extending public supervision over airplane traffic has been made by Governor Louis F. Hart of this State. In directing the State Public Service Commission to investigate the matter of landings and to recommend safety and police provisions, the Governor announced his intention of laying the problem of airplane traffic regulation before the Legislature this winter.

Tightened Credits Hit Owen Magnetic

Stockholders Consider Future Action—Parts Delay Holds Up Production

NEW YORK, Aug. 18—Inability to get parts and materials for a production of 500 cars during the calendar year and the withholding by the banks of certain promised funds to carry on manufacture for several months has caused the International Fabricating Corp., of Wilkes-Barre, Pa., to call a meeting to determine future plans.

This concern in September, 1919, entered the motor car manufacturing field in the production of Owen Magnetic cars. At that time R. M. Owen contracted with the company to manufacture and sell 500 cars during the calendar year. Delivery of these cars was to have started in March, but the first vehicle was not delivered until the end of July. The delay was due to failure to secure parts.

On June 1 the International Fabricating Corp. reincorporated under the name of the Owen Magnetic Motor Car Corp., and $300,000 additional capital was paid up by stockholders, at which time certain banks agreed to advance additional funds to carry out the manufacturing program. The financial conditions which developed during June caused the banks to withhold such advance of funds and lack of working capital precipitated the meeting of stockholders.

Since September the company has tooled up for production, investing several hundred thousand dollars in drawings, tools, jigs and equipment. This tooling up was so advanced that the first cars were coming through on a production basis and some parts for the complete year's production of 500 cars have been completed.

On June 1 the company's financial statement showed an inventory of $433,686, which was practically all paid for. At that time the finances of the company were in good condition, the liabilities outside of the preferred stock totaling $369,905, with net assets of practically $1,000,000 in excess of this amount. There was cash and working funds of $253,000.

In the above connection it is worthy of note that the International Fabricating Corp., on or about June 1, exercised its option, which was incorporated in its license agreement, to acquire the trade name "Owen Magnetic." Mr. Owen, however, was not a stockholder or officer in the International Fabricating Corp., although he lent this company his aid in sales promotion work.

STANDARD RUBBER ORGANIZED

NEW ORLEANS, Aug. 16—The Standard Rubber Co., capitalized at $5,000,000, will erect a factory for the manufacture of automobile tires in New Orleans by Jan. 1, 1921, according to I. J. McGee, secretary and general manager of the new company. The corporation was formed to manufacture a new puncture-proof tire, invented by G. W. Gish, superintendent of the Doss Tire Co., of Atlanta. Several prominent Louisianians are in the company, including L. C. St. Germain, cashier of the Breaux Bridge Bank, president; J. W. Olivier, cashier of the bank of Arnaudville, treasurer; John T. Powers, cashier of the First National Bank of Alexandria; W. A. Brownlee, general manager of the Big Pine Lumber Co., Colfax, and Dr. J. L. Wilson, of Alexandria.

Hurlburt Creditors Again File Petition

NEW YORK, Aug. 18—A petition in bankruptcy has been filed against Hurlburt Motors, Inc., which handles the Hurlburt truck, by three creditors. A previous petition filed in June was dismissed. The petitioners in the present action are the Harrisburg Mfg. & Boiler Co., with a claim of $24,960; John Campbell, $8016, and Samuel F. Dunkle, $8016. Liabilities are fixed at $75,000. The company has been in and out of the courts for several months.

Hurlburt Motors, Inc. is headed by William B. Hurlburt, who organized the Hurlburt Motor Truck Co. It was formed early in the year when an arrangement was made with the Harrisburg Mfg. & Boiler Co. to manufacture the truck. Difficulties arose, it is said, because of failure to deliver trucks promptly to take care of prospective sales, and also because of a disagreement over the issuance of a new class of preferred stock to creditors, rather than pay them on a cash basis. Hurlburt asserts he has stood out against the stock plan.

Left-hand Drive Ban Thwarted in England

NEW YORK, Aug. 18—Information has reached this city that British automobile authorities have thwarted, for the present at least, the attempt to have the use of motor cars with left-hand drive forbidden in England. If such a regulation had been established it would have been another barrier against the importation of American cars. The agitation was started in the newspapers and there have been intimations that British manufacturers may have had something to do with instigating it.

The Departmental Committee, which has charge of new rules for road vehicles, has decided that "there is no available evidence at the present time from the point of view of public safety to justify the prohibition or restriction of the use of left-hand driven motor vehicles in this country, though uniformity of construction of such vehicles may for some reasons be convenient."

ENDURANCE RING FORMED

CHICAGO, Aug. 18—The Endurance Piston Ring Co. has been formed to manufacture the piston ring formerly known as the super power piston ring.

Virginia Coal Land Purchased by Ford

Four Thousand Acres in Latest Purchase—Other Deals Reported Pending

DETROIT, Aug. 16—Reports that the Ford Motor Co. had purchased the holdings and leasehold of the Nuttall Smokeless Coal Co. in the New River district of West Virginia were confirmed to-day. The tract purchased comprises 4000 acres and the output is expected to equal that of the Banner Fork property in Kentucky purchased a few weeks ago.

At the time of the latter purchase officials of the company said the output would be approximately one-third the requirements of the Ford properties, but no statement could be secured as to negotiations for other properties on or adjacent to the D. T. & I. railroad bought by Ford at the same time. The presence of Percy Haly, holder of extensive coal properties in eastern Kentucky, in Detroit a few days ago, gave rise to the report that a big deal was under way.

Ford officials refused to-day to make any statement regarding other deals in prospect. W. H. Smith, research engineer, who is looking after that end of the company's business in the absence of Chief Engineer W. B. Mayo, declined to speak.

Haly during his visit here refused to say what his mission was, though he admitted conferences with officials of the Ford Co. Haly, besides owning some of the biggest mines in Kentucky near the West Virginia line, is in charge of the vast properties of the late John C. C. Mayo, one of the largest operators in the eastern Kentucky district.

Smith would make no statement as to the consideration involved in securing the Nuttall properties. He said the product of the mines was different grade from that of the Banner Fork and was purchased for use in certain plants of the company where a lower grade of coal is most adaptable.

CARS ESSENTIAL FOR PHONES

NEW YORK, Aug. 16—Statistics gathered by the National Automobile Chamber of Commerce show that not only are telephone companies large users of trucks but of passenger cars as well. The New York Telephone Co. is the largest user of cars and commercial vehicles. Its fleet numbers 935, of which 637 are runabouts and 68 are ¾-ton trucks. The Bell Telephone Company of Pennsylvania is the second largest user of passenger cars, having 514. Other large users of passenger automobiles among the telephone companies are:

Pacific Telephone & Telegraph Co., 204; Chicago Telephone Co., 170; Southern New England Telephone Co., 157; Iowa Telephone Co., 120; Southwestern Bell Telephone Co. of Missouri, 96; Wisconsin Telephone Co., 89; Nebraska Telephone Co., 51.

5000 Applicants Ask Leases in Oil Lands

Operations Soon to Start Will Increase Fuel Production—Coast Supply Assured

WASHINGTON, Aug. 19—Further promise of an increased gasoline supply is contained in the statement of Clay Tallman, commissioner of the General Land Office, Department of the Interior, that more than 5000 applications for leases under the new oil leasing act have been filed. Pioneers in the oil industry who were loath to take advantage of the new legislation have manifested a change of mind with prices of gasoline climbing. Operations will start soon in the public lands comprising the majority of Western states.

California intends to provide every safeguard against a repetition of the shortage in gasoline which has interfered with automobile trade of late, according to statement issued to-day by Robert B. Armstrong, manager of the Washington offices of the Los Angeles Chamber of Commerce. Various California civic and commercial organizations have received assurances from oil companies that an adequate supply will be provided for the use of thousands of visiting motorists as well as Californians.

FLYING CLUBS NOW MERGED

NEW YORK, Aug. 17—The Aero Club of America and the American Flying Club have voted formally to amalgamate under the name of the Aero Club of America. The clubs will occupy the quarters of the American Flying Club at 11 East Thirty-eighth Street. The combined membership of the organizations is 1800. Opposition to the merger was voiced at the meeting of the Aero Club by Charles J. Glidden and Lieut. Rafe Emerson, said to have represented Henry Woodhouse, suspended member of the board of governors. The opposition was in a small minority, however.

DELION BUYS DREADNAUGHT

BALTIMORE, Aug. 17—The Delion Tire & Rubber Co. has purchased the plant and equipment of the Dreadnaught Tire & Rubber Co. of this city. Extensive alterations and improvements will be made, with the addition of considerable machinery. The plant now has a capacity of 500 tires and 1000 tubes a day. The factory will be in operation within 90 days and will manufacture Delion tires. John W. Price is president of the Delion company; W. C. Price, vice-president in charge of sales; R. B. Arnold, vice-president in charge of manufacture, and R. L. Swats, sales manager.

MERCHANTS GET TRUCK VIEWS

PHILADELPHIA, Aug. 14—At the two-day convention of the traffic group of the National Retail Dry Goods Association, held in the Chamber of Commerce, at which 1600 stores were represented, the address of George P. Wilson, commissioner of transportation of the Chamber of Commerce and a member of the Philadelphia terminal committee, made a distinct impression on those present.

Wilson made a plea for greater development of truck traffic on the highways of the country and water traffic, the railroads to move freight over long distances that trucks could not handle economically, and package freight that canalboats could not handle properly, thus obtaining relief from overcrowded rails, terminals and platforms.

No Special Rail Rates for Rubber Companies

WASHINGTON, Aug. 16—Applications of manufacturers of rubber tires and inner tubes for special carload rates on all shipments were denied by the Interstate Commerce Commission in its decision permitting express companies to increase the present rates by 12.5 per cent. The commission claimed that no adequate ground to support the request for an exception for tires and tubings had been disclosed by the shippers.

Rubber manufacturers wanted the commission to establish carload commodity rates, to apply only when the articles are loaded and unloaded by the shippers, "enough lower than the less-than-carload or any-quantity rates to compensate for the absence of a pick-up and delivery service in such cases." The commission found that "coupled with a showing of the volume of inbound shipments of fabric and outbound shipments of tires and tubes, principally by express because of pressing demands, the opinion is expressed that with the restoration of normal freight service the carload express business will substantially decline."

According to the commission "this opinion is an echo of the generally voiced criticism that express companies have permitted service to be broken down by acceptance of volumes of traffic that should move by freight." The award of the commission does not take into consideration the wage increase recently handed down by the Federal Labor Board.

MIRROR LAW RESTRAINED

LOUISVILLE, Aug. 16—Suit to annul the recently enacted State law requiring mirrors on driver's seat of all motor trucks was filed yesterday in the Circuit Court at Frankfort by Albert Terstegge, president of the Louisville Automobile Club, and Lyman Graham, a taxpayer of Frankfort. The suit is backed by the Louisville Truck Dealers' Association, of which Edward J. Hackett, Sr., is president.

As a result of the petition, which alleges that the law is ambiguous and filled with technical defects, the court granted an injunction restraining the State Tax Commission from letting a contract for $27,000 worth of mirrors, which was about to be placed.

Tire Manufacturers Discuss Conditions

Editor Sees Good Business Era for Smaller Companies—Lower Prices Distant

CEDAR POINT, OHIO, Aug. 18—Various subjects of importance to tire manufacturers were discussed at the first annual convention of the Midwest Rubber Manufacturers Association which ended here yesterday. While most of those present were associate members, the tire industry was ably represented by tire manufacturers from all the centers between Omaha and New York. The business session held at noon yesterday was presided over by T. E. Smith of Akron, the president.

The convention program covered a wide range of subjects. Jesse Ladow of the Mansfield Tire & Rubber Co., discussed rubber production before and since the war. Edward S. Babcox of Akron considered advertising and salesmanship of tires, contending that a good product is the first requisite for a successful advertising and selling campaign. He argued that no amount of printer's ink can successfully market a poor product or make it a good one.

Babcox also told of the replies received to fifty telegrams he sent to industrial leaders asking them for their views on present business conditions. He said the consensus of their opinions was that the country recently has been indulging in a financial spree and in going back to normal is only suffering the consequences. One prominent New York banker wired him that sufficient industrial credit is obtainable to take care of the country's needs under normal conditions.

H. O'Reardon of *Tires* predicted an unusually good business era for the smaller manufacturers next year. He presented figures designed to show that at present there is an over-production of tires. He said that the daily production of the five largest producers aggregates 102,000 tires or 70 per cent of the total, the remaining 30,000 being made by other manufacturers.

8,000,000 Cars Offer Market

Against these production figures, O'Reardon pointed out that there is a tire market to supply about 8,000,000 cars, domestic and export. With an average of 20 miles a day for each car, assuming the average tire will last for 6000 miles, the average daily tire consumption would equal more than 106,000 tires. These figures would indicate an over-production of 26,000 tires a day.

J. E. Allen, sales manager of the Braender Tire & Rubber Co., strongly questioned the probability of a decrease in tire prices in the immediate future. He declared the labor wage scale would have to go down before there could be any material change in prices. This opinion was general among the other manufacturers present.

INDUSTRIAL NOTES

Westinghouse Electric & Mfg. Co., announces that more than 90 per cent of its employees have taken advantage of the insurance and savings plan recently put into effect to enable them to increase their life insurance by depositing 2 per cent of earnings. The policies run up to $2,000, according to length of service and the deposits pay 4½ per cent compounded semi-annually.

Acme Die Casting Corp., Brooklyn, has opened a branch office in the machinery exhibition department of the Philadelphia Bourse. It is in charge of Edward McK. Hunt and will handle the company's business in New Jersey, eastern Pennsylvania, Maryland, Delaware and District of Columbia.

Jorgenson Mfg. Co., Waupaca, Wis., is starting work on a large brass foundry, which is the first of a series of new plant extensions projected for quadrupling its output by the end of the year. It has a 17-acre site and a water power with a capacity of 500 hp. which is being developed further.

Simplex Corp., Chicago, makers of the Simplex steering wheel lock for the Ford, Dodge, Overland "4" and Chevrolet "490," have taken over the Theftproof auto lock formerly manufactured by the Hershey Manufacturing Co., Denver.

General Tractors, Inc., will remove its executive offices from Chicago to Watertown, Wis., where the company's principal factory is located. Manufacture of Monarch tractors will be concentrated there and the plant enlarged to meet requirements.

Rubber Universal Joint Co. of Detroit has been given a site at Brighton, where citizens will erect a plant for the company, which will move there right away. The concern makes devices used by automobile manufacturers.

Rickard & Sloan, Inc., advertising agency has removed from the Evening Post Building to 25 Spring Street, where more space is available.

LANCASTER COMPANY FORMED

LANCASTER, PA., Aug. 13—The Gasco Mfg. Co. is being incorporated as a close relation to the General Supply Co., a jobbing house. The officers in the new company are G. H. Shreiner, president; G. L. Whallon, vice-president; R. L. Whallon, secretary, and Roy W. Shreiner, treasurer. The incorporation is for $50,000. The plant will be in the new building at 615 North Prince Street, 28 x 90 ft. The products at the start will include air compressors, steering wheel locks and valve grinders. Roy W. Shreiner is manager of the Lancaster automobile show.

HANDLEY-KNIGHT NEAR READY

KALAMAZOO, MICH., Aug. 16—Work in the new plant of the Handley-Knight Motor Co. here has progressed so far that the temporary engineering and purchasing offices have been moved from Toledo to this city. It is expected actual manufacture of cars will begin next month and materials already are being delivered. The shipment of finished cars may be started by the latter part of September. Most of the machinery has been installed.

The new car, in which the four-cylinder Knight sleeve valve motors will be used, will be of 125-in. wheelbase. It will weigh approximately 3200 pounds. The models will include a seven-passenger touring car and a seven-passenger sedan mounted on the same chassis. The company has completed its plans for merchandising the Handley-Knight and is now making territorial arrangements with distributers.

G. M. C. Negotiating for Timber Tract

MILWAUKEE, Aug. 16—General Motors Corp. is reported to be negotiating for large tracts of timber land and a site for a vast establishment in the heart of the hardwood belt of Northern Wisconsin and Upper Michigan to be the source of its supply of all wood and wood stocks. The announcement that negotiations are pending follows the news that the Ford Motor Co. has started work on a large sawmill, planing mill and body stock factory at Ironwood, Mich., to furnish all wood required by its main and assembling plants. Norway, Mich., is reported to be the center of the proposed General Motors enterprise. Like the Ford acquisitions, the General Motors prospective holdings include water power site, lands containing iron ore, besides vast areas of timber.

OVERLAND CONSERVES RAGS

TOLEDO, Aug. 17—Conservation of rags at the Willys-Overland plant is very important nowadays. Not only is every rag carefully laundered, but the smallest rents are repaired by skilled workers. Torn pieces are sewed up by the operators of four power sewing machines. The smaller pieces, which have outlived all usefulness, are put up in bales and sold to paper manufacturers.

The laundry wagons of the factory collect about ten tons of soiled rags each week, and their value of $3,000 is a conservative figure.

The firm which supplies the Willys-Overland Co. with rags recently sent a representative to Europe with instructions to bring back two ship-loads of rags. He found rags priceless.

KANSAS CITY TO HAVE BUSES

KANSAS CITY, Aug. 16—Steam-driven motor buses, with a capacity of forty to fifty passengers, will soon be operating here, according to officials of the Kansas City Jitney Association, who are now selecting the type of bus to be used. The selection is being made with the end in view of stabilizing and standardizing motor bus traffic and making the bus the chief means of surface transportation in Kansas City. The steamer has been favored in the selection and the body will be a double decker, with upper deck inclosed. The association will select its type of engine and body and will have the machines built on contract. American-built buses have been investigated and English types, such as are in use in London, are now being discussed.

METAL MARKETS

So many conflicting factors enter into an unbiased appraisal of the iron and steel situation that the automotive purchasing agent who would stake out for himself a buying program has indeed a hard nut to crack. Flaring headlines heralding sales of pig iron at $50 are not only apt to make him uneasy, but, moreover, to warp his judgment, because all price advances are interpreted these days in the light of the effect of the increased freight rates. When he comes to read the report itself he will find, however, that no sales have been made so far at $50; that those that were made at $48 to $49 were insignificant in point of tonnage; that whatever price in excess of $46 was paid must be considered in the light of a premium for prompt delivery, the scarcity of which cannot be denied. The merchant pig iron market for 1921 is still in a state of flux and sales for early shipment are hardly a safe criterion. Statistically, all hair-splitting arguments to the contrary notwithstanding, the output of pig iron and the outlook for ore supply are such as to warrant confidence in an adequate supply. Moreover, the easing off in the demands made on the integrated steel producers will mean in the course of time a larger supply of merchant pig. It is astounding how much is being said just now of the impending advance in freight rates and how little of the shrinkage in fuel prices. The silence of the Pittsburgh correspondents on this score is truly singular. The Philadelphia Public Ledger's correspondent in that city, however, wired his paper a few days ago that sales of coal had been made at $9, compared with sales at $12.50 a few days previous, that coke prices were beginning to tumble and that operators in the Connellsville region were beginning to predict freely much heavier declines in coke prices amid the steadily continuing improvement of the transportation situation. Pig iron sellers are in a touchy frame of mind on the subject of the reflex of lower coke prices on pig iron values. That, however, appears to be no reason for consumers to share their attitude. The steel market, especially in products for automotive consumption, shows a lull. Premiums on many commodities have vanished, but specialties, such as bolts and nuts, may undergo upward revision coincident with the advance in freight rates.

Aluminum—The Aluminum Company of America has announced a new set of price quotations, effective on all business from Aug. 10. The new quotations on 15 ton lots, f.o.b. producing works, are as follows:

99% and purer	35.10
98 @ 99% pure	34.90
No. 12 alloy	34.10
Sheets No. 18 gauge	49.20

The advances amount to approximately 2c. per pound ingots and bars, 2½c. per pound on No. 12 alloy and 5c. per pound on sheets.

Tin—While still restricted, the market now deserves consumers' attention, as seasonable consuming demand is certain to make itself felt soon.

Lead—Paucity of the immediately available supply, which has been repeatedly emphasized in our market report, caused a further advance by the chief interest to 9c., New York, while resellers ask 9.35c. Predictions are made that much larger tonnages of lead will be used in the future for automotive storage batteries and that this will tend to accentuate the shortage in the supply. For the present, however, the market appears to have reached its peak.

Automotive Financial Notes

Acme Motor Truck Co. has increased its dividend rate from 7 to 10 per cent, which will apply to the present $600,000 of common stock for the last half of 1920. The balance of the common $150,000 is being offered for sale at $20 a share to present stockholders. They are being allowed to purchase on the installment plan, because the company does not find it necessary to arrange for any immediate large increase in working capital. The new stock, however, will not be issued until Nov. 15, 1921, and will not be subject to dividends until that time. The par value is $10 and the book value is $19.72.

Greenfield Tap & Die Corp. has declared a regular quarterly dividend of 1½ per cent on preferred stock, payable Oct. 1, and a regular quarterly dividend of 75 cents a share on common stock, payable Oct. 1. This is equivalent to $4.50 a share on old stock, as 50 per cent stock dividend was declared July 1. On the former issue of stock stock dividends at the rate of $4 were paid.

Ajax Rubber Co., Inc., reports net earnings of $1,528,634 for the six months ended June 30, equivalent to $7.64 a share earned on the 200,000 shares of stock at $50 par. This compares with $1,886,730 or $9.43 a share earned in the corresponding period of 1919. Gross sales in the six months of 1920 exceeded those in the 1919 period by about 16 per cent.

Gramm-Bernstein Motor Truck Co. of Lima, Ohio, has increased its capital from $1,000,000 to $5,000,000. The entire amount will be issued as common stock. A stock dividend of 50 per cent has been declared out of its surplus earnings to common stockholders of record of July 31. Employees will be given opportunity to purchase the new stock.

Wetmore Reamer Co., Milwaukee, has changed its authorized capitalization from $75,000 to the equivalent of $250,000 by a new issue of 2500 shares of non-par value shares. The increase is made to finance the expansion of the business with the greatly increased facilities provided by the new works.

Packard Motor Car Co.—Earnings for the quarter ended May 31 were $1,921,991 and for the 9 months ended May 31 were $5,068,798. Sales are slightly below the spring record but it is said that cancellations for passenger cars reported by dealers during the quarter numbered only 240, of which 173 were re-sold.

Gray & Davis, Boston.—Since entering into a sales agreement with the American Bosch Magneto Co., the company has authorized 30,000 additional shares of common stock, par value $25, increasing the total outstanding to $3,472 600. The stock will be issued at the discretion of the directors.

White Motor Co. reports net operating income of $330,152, equivalent to 37 cents a share earned on the $4,349,900 capital stock for the quarter ended June 30. This compares with $809,727 or 93 cents in the preceding quarter, and $370,415 or 42 cents in the corresponding period of 1919.

Dort Motor Car Co. first mortgage bonds, to the amount of $1,500,000, are being offered by a Chicago bank to mature serially in blocks of $300,000, from May, 1921, to May, 1925. The bonds are offered at prices ranging from 99½ to 99⅛ per cent, to yield from 7.70 to 8 per cent.

Koehler Bros. Iron Works has been incorporated as Koehler Bros. Co., with a capital of $45,000, at Saginaw. The company is seeking a new site on which to erect a plant to handle the rapidly increasing business. C. A., J. A., J. H. and C. J. Koehler are its incorporators.

Goodyear Tire & Rubber Co. has declared a quarterly dividend of 2½ per cent on the common stock, payable Sept. 1. Previously the company had been paying quarterly dividends of 3 per cent. On May 28 the company declared a stock dividend of 150 per cent.

Tractor Appliance Co., New Holstein, Wis., has been incorporated with $50,000 capital to manufacture appliances, implements, tools and accessories for tractors, motor trucks, etc. The incorporators are F. H. Edson, H. C. Thiessen and H. N. Edens.

International Motor Truck Corp. reports for the six months ended June 30 net profits after charges and Federal taxes of $2,163,421, equivalent after preferred dividend to $5.64 a share on the 283,108 shares of outstanding common stock of no par value.

Heil Co., Milwaukee, has increased its capital stock from $100,000 to $250,000. It is erecting a large shop addition to be ready about Oct. 1, when the capacity will be increased 35 to 40 per cent.

Motor Products Corp.—Gross sales for the 6 months ended June 30 were $9,352,958 and net earnings after reserves for State and Federal taxes were $1,183,510.

Liberty Motor Car Co., in its balance sheet as of May 31, shows assets of $3,349,593 and liabilities of $2,869,427, with reserves of $260,622 and a surplus of $219,533.

Stewart Warner Speedometer Co. reports sales in July amounting to $1,300,000, compared with $985,000 in July, 1919.

Capital Brass Works, Detroit, has increased its capital stock from $200,000 to $500,000.

McCord Mfg. Co., Inc., reports gross business for the first half of 1920 of $8,869,381.

Victory Ring Co. has been incorporated in El Paso with a capital of $1,000,000.

Black & Decker to Add $250,000 to Preferred

BALTIMORE, Md., Aug. 14—To provide working capital for its business, which has grown rapidly since its organization in 1910, the Black & Decker Mfg. Co. is about to issue $250,000 in 8 per cent cumulative preferred stock, which will carry with it a bonus of 25 per cent of the common stock of the company, par $25. The par value of the preferred will be $25, redeemable at $27.

Arrangements have been made to sell stock to the employees of the company on a time payment basis, the amount of time being determined by the length of service of the employee. Every employee will be given a minimum time payment period of one year, regardless of the term of employment, and five years will be the maximum.

The present capitalization is $250,000 common and $100,000 preferred. It is desired to bring the capitalization to $1,000,000 in each class of stock. During the first six months of the year the financial statement shows a business of $1,028,935, and it is stated that the business has been doubled each year for the past two and one-half years, the records of 1915 to 1919 inclusive being:

1915	$87,000
1916	198,000
1917	231,000
1918	513,000
1919	1,105,000

The assets total $1,117,949, including patents and good will at $1 each.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Aug. 19—As was to be expected with a period of declining commodity prices and slackening activity in a number of industrial lines, both the number of commercial failures and the liabilities involved are increasing. While these failures have not reached alarming proportions, they point to a necessary readjustment which is taking place in industry and trade generally. In July the defaults in mercantile and industrial lines numbered 681, covering liabilities of $21,906,412. These compare with 452 failures and liabilities of $5,507,010 in July, 1919.

The call loan market last week was characterized by relatively low rates of interest and an unusually narrow range of fluctuations in the rates. The range was from 6 per cent to 7 per cent, compared with 6 per cent to 8 per cent the previous week. Time money rates remain unchanged and there is little activity in this field.

The weekly statements of the Clearing House institutions and of the Federal Reserve Banks show the continued effect of the seasonal crop-moving demands upon credit. The Clearing House members showed a continued and increased excess of reserves over the legal requirements. The most significant change from the previous week, however, was a loss of $40,937,000 in deposits, while at the same time loans increased $10,365,000. This is indicative of rather heavy withdrawals, presumably for the interior. Cash in the vaults of members, moreover, declined $2,298,000 and the bills payable item increased $48,901,000 to $1,157,805,000, which is the largest amount reported in the whole period of more than a year during which this item has appeared in the weekly statement.

The New York Federal Reserve Bank reported a reduction of $16,085,088 in cash reserves, despite a reduction of $16,893,678 in the indebtedness of other Federal Reserve Banks to the local bank. Loans to member banks increased $60,854,059.

The Federal Reserve Banks as a whole reported a gain of $1,141,000 in cash reserves, and bills discounted increased $20,401,000. Net deposits were lower by $5,512,000, but Federal Reserve notes in circulation increased $27,320,000.

Men of the Industry

H. F. Wardwell, who for the last three weeks has been in charge of the Briscoe Motor Corp., will be elected president by the Board of Directors, according to information received at the Briscoe plant today. Wardwell succeeds Frederick C. Cowan, who has been transferred to Joliet, Ill., to take charge of foundry interests operated by the syndicate in control of the Briscoe Corp. Wardwell comes to Briscoe from the Burnside Steel Corp. at Chicago, of which he has been president for several years.

Marcus I. Brock has severed his connection with the Premier Motor Corp., after two years service which began with the procurement of war materials. He then took over the handling and settling of Government contracts. This work has just been completed. Brock also has served of late as assistant sales manager. He will make his headquarters in Philadelphia for the present and will continue his connection with the automotive industry.

Capt. Robert E. Lee has resigned as secretary of the Sales Manager's Bureau of the St. Louis Chamber of Commerce to devote all of his time to the automotive trade here. Captain Lee is secretary-manager of the St. Louis Automobile Manufacturers' and Dealers' Association, and is also secretary of the truck bureau of the association and of the Motor Accessory, Tire Dealers' and Battery Dealers' Associations, all of which he organized.

Frank C. Kip, formerly sales promotion manager of the Packard Motor Car Co., has disposed of his interest in and resigned as president of the Automotive Products Corp., California, to become general sales manager of the George D. Bailey Co., Chicago, service division, for Shafer roller bearings. Kip will have entire charge of sales and advertising.

E. A. Barnes has taken over the position of production manager at Willys-Overland succeeding C. W. McKinley, one of the Overland pioneers. McKinley has become connected with the Tillotson Mfg. Co., as sales engineer. Otto W. Porter has been made general foreman of seven Overland departments and W. R. Ourand has been made plant engineer.

Donald S. Michelsen, formerly general manager of the Worcester Pressed Steel Co., Worcester, Mass., assumed the office of General Manager of the Globe Machine & Stamping Co., Cleveland, Aug. 1. A. F. Schroeder, who has been general manager for almost twenty years, will continue to hold the office of president.

Guy H. Peasley, lately distribution manager of the Olds Motor Works, has been promoted to the position of assistant sales manager, succeeding C. F. Batchelder, who has been made general manager of the H. J. Lamar Co., Inc., Macon Oldsmobile distributers.

H. Leon Larisey has joined the New Britain Machine Co. as sales manager of the tractor division. In the last five years Larisey has been connected with the Smith Motor Truck Corp., Knickerbocker Motors, Inc., and the Short Turn Tractor Co., Minneapolis.

M. L. Pulford has been appointed service engineer in charge of the service department of the Commerce Motor Car Co., Detroit. Pulford has been in the employ of Commerce for the past seven years, most of his time in the engineering department.

F. R. Pleasanton, former manufacturing director of the Savage Arms Co., has been appointed general manager of the Parish Mfg. Corp., makers of Parish heat treated automobile frames, with factories at Reading, Pa., and Detroit.

C. W. McCone, formerly with the B. F. Goodrich Co., has been appointed consulting engineer for the Mansfield, O., plant of the Columbia Tire & Rubber Co. The Mansfield factory is more than 75 per cent completed.

Herbert R. Small has been appointed manager of the export division of the Traffic Motor Truck Corp. of St. Louis. He was formerly assistant export manager of the Republic Motor Truck Co., Alma, Mich.

New Officers Chosen to Head Immel Company

COLUMBUS, Aug 16—A complete refinancing and reorganization of John Immel & Sons Co., manufacturers of closed bodies, has been announced and steps have been taken to bring the product of the factory up to a high point. By the reorganization, Allen F. Beck is president and general manager; George M. Sunday of Chicago, son of Billy Sunday, the celebrated evangelist, vice-president in charge of sales and operations; Minor Wilson, secretary; Roger B. Allen, treasurer; V. L. Decker, production manager, and W. M. Miller, assistant general manager.

The company is just completing a large modern plant which has approximately 240,000 feet of floor space. About 25 per cent of the woodworking machinery has been installed and practically all of the metal working machinery is in place. Dry kilns and a boiler plant will be completed in about six months, when it is expected to have the output up to 65 bodies daily. The company has booked large contracts for closed bodies with the Liberty, Velie and National companies.

The deal which brings a large amount of Chicago money into the concern was closed by Arthur M. Crumrine, president of the Arthur M. Crumrine Co. Roger B. Allen was formerly connected with the Bethlehem Steel Co. While the new plant is being put in condition for operation, work is progressing at the old plant.

WILLIAM V. COUCHMAN DIES

CHICAGO, Aug. 16—A cable message from Brussels, Belgium, announces the death in that city of William V. Couchman, vice-president of the International Harvester Co., in charge of European manufacturing sales and experimental work. He died while undergoing an operation for an affection of the throat. His body will be brought to the United States. Couchman was born in Minneapolis in 1865, and entered the employ of the McCormick Harvesting Machine Co.'s branch in 1882. He rose rapidly, and in 1899 was placed in charge of the company's business at Hamburg. He remained there until the International Harvester Co. was formed and then was assigned to look after the new company's interests in the Central and Eastern districts of Europe. In 1912 he was placed in charge of all European sales. In 1916, Couchman was recalled to the United States and appointed division manager in charge of all sales, foreign and domestic. As soon as possible after the end of the war he was sent again to Europe with the rank of vice-president.

Pierce-Arrow Earnings $1,423,044 to June 30

BUFFALO, N. Y., Aug. 16—Earnings of the Pierce-Arrow Motor Car Co. for the first half of this year, after all charges and Federal taxes, amounted to $1,423,044. The surplus available for the common stock was equal to $4.09 a share after deducting preferred dividends. Indications point to a decline in profits for the rest of 1920, and for that reason it is said there is little likelihood of an immediate resumption of common dividends which were discontinued in July, 1919.

The Pierce-Arrow company has been operating with a reduced working force for the past six weeks, chiefly because of a shortage of materials and poor railway transportation. While most of the men laid off were dropped because of an insufficient supply of materials, the working force has been gradually reduced because of a reorganization of manufacturing facilities by which the company has been able to produce cars and trucks with a lower ratio of men per unit than heretofore.

A. S. M. E. ANNUAL MEETING SET

NEW YORK, Aug. 16—The 1920 annual meeting of the American Society of Mechanical Engineers will be held in the Engineering Societies Building from Dec. 7 to Dec. 10. Sessions will be held on the subjects of appraisal and valuation and the application of engineering to woodworking. The newly founded professional sections on management, power, fuels, machine shop, railroads and textiles will also conduct sessions. In addition a number of valuable papers will be presented at general sessions. A memorial session for Dr. Brashear is planned.

FIELD BODY INSTALLS POWER

OWOSSO, MICH., Aug. 16—Field Body Corp. is installing a new power plant, which will furnish heat, light and power for the entire plant, preventing a recurrence of the handicaps under which the company has labored in the past.

The company has just sent out checks for the first quarterly dividend on the stock issued recently. The stock pays 8 per cent annually. Of the $200,000 issued $155,000 has been sold, all but $40,000 of which was taken by investors in Owosso. The other $40,000 has been taken by company employes.

Calendar

SHOWS

Aug. 23-27—San Francisco, National Traffic Officers' Safety First Exposition, Auditorium, C. De Witt De Mar, Manager.

Aug. 25-Sept. 3—Des Moines, Annual Fall Automobile Show in connection with Iowa State Fair, C. G. Van Vliet, Mgr.

Aug. 28-Sept. 11—Toronto, Canada, National Automobile Show, Automotive Industries of Canada, in connection with Canadian National Exhibition, Exhibition City.

Aug. 30-Sept. 4—Milwaukee, Annual Automobile Show in conjunction with Wisconsin State Fair.

Sept. 6-11—Indianapolis, Twentieth Annual Fall Automobile Show in connection with Indiana State Fair.

Sept. 18-25—Cincinnati, Annual Automobile Show, Passenger cars only, Cincinnati Automobile Dealers' Ass'n. Music Hall Buildings.

Sept. 20-26—Los Angeles, National Tractor and Implement Show of the West, Tractor and Implement Dealers' Ass'n of Southern California. Guy H. Hall, Mgr.

Sept. 27-Oct. 2—Buffalo, Closed Car Show, Buffalo Automotive Dealers' Ass'n, Elwood Music Hall, C. C. Proctor, Mgr.

Oct. 6-16—New York. Electrical Show. Grand Central Palace. George F. Parker, Manager.

Nov. 14-21—New York, Automobile Salon, Commodore Hotel Ballroom.

Nov. 15-20—Chicago, Automotive Equipment Show, Coliseum, Automotive Equipment Association.

Dec. 10-18—New York. Motor Boat Show. Grand Central Palace.

Jan. 8-15—New York. National Passenger Car Show, Grand Central Palace. Auspices of N.A.C.C.

Jan. 29-Feb. 4 — Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.

Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.

FOREIGN SHOWS

Sept. 4-25 — London, Machine Tool and Engineering Exhibition, Machine Tool Trade Ass'n, Inc., Olympia.

October—London. Commercial Vehicle Show, Olympia.

Nov. 4-13—London, International Motor Exhibition, Society Motor Mfr's and Traders, Ltd., Olympia and White City.

Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.

Jan. 7 — Sydney, Australian Motor Show.

CONTESTS

Aug. 28—Canandaigua, N. Y. Dirt track.

Aug. 27-8—Flemington, N. J. Dirt track.

Sept. 5 — Targa Florio Race. Sicily.

Sept. 6—Hornell, N. Y. Dirt track.

Sept. 6—Cincinnati, O. Speedway.

Sept. 6—Uniontown, Pa. Speedway.

Sept. 17-18—Syracuse, N. Y. Dirt track.

Sept. 25—Allentown, Pa. Dirt track.

Oct. 1-2—Trenton, N. J. Dirt track.

Oct. 8-9—Danbury, Conn. Dirt track.

CONVENTIONS

Sept. 1-3—Chicago. Thirteenth Annual Convention National Gas Engine Ass'n. Congress Hotel.

Sept. 2 — Cleveland, Trailer Manufacturer's Association of America.

Sept. 16-17—Cleveland. Motor and Accessory Manufacturers' Ass'n. Credit Convention.

Oct. 11-13 — Chicago, National Association of Purchasing Agents' Annual Convention.

Dec. 7-10—New York. Annual meeting American Society of Mechanical Engineers. Engineering Societies Building.

Jan. 11-13—S. A. E. Annual Meeting, New York City.

First of Lake Planes Arrives for Service

DETROIT, Aug. 13—The first unit of the flying boat fleet of the United States Aerial Express Co. arrived here to-day from Philadelphia. Six passengers were carried, the trip being made with but one interruption, low grade fuel clogging the engine and compelling a stop at Amherstberg, Ontario.

This machine is a converted F-5-L of 110 ft. span, fitted with two Liberty engines. Seating capacity is provided for 16 passengers. A compartment with a capacity of about one ton is built into the nose of the body and lined with copper and asbestos to protect the contents from water and fire. The hull is double skinned throughout and the space between the skins filled with a very light vegetable fiber. The cabin is 16 ft. 9 in. long, by five feet high, with a minimum width of 54 in.

Makes First Trip

DETROIT, Aug. 17—Aerial express service between Detroit and Cleveland was inaugurated at noon when Lieutenant Dunn took to the air at the foot of Crane Street. He is scheduled to arrive in Cleveland at 1:15 p. m., carrying five mail sacks weighing 50 lb. each; 600 lb. of express matter and seven passengers. He will reach Detroit returning at 5:30 to-night. Daily trips leave Detroit each morning and arrive at 1:15 p. m. Return will be after stop of hour and fifteen minutes in Cleveland. A second plane will be put in service Aug. 23 and a third a week later.

TRAILER MEMBERSHIP NOW 23

NEW YORK, Aug. 17—The Reliance Trailer & Truck Co. of San Francisco has been admitted to membership in the Trailer Manufacturers' Association of America. With the five new members admitted last May, the organization now has a membership of twenty-three of the leading trailer manufacturing companies in the country. The association was organized in March, 1919, with fourteen charter members, and opened headquarters in New York sixteen months ago. A meeting of the association will be held in Cleveland on September 2, which all active trailer manufacturers will be invited to attend.

Basis for Discounts Sought by Tire Men

LOS ANGELES, Aug. 16—To stabilize conditions in the tire industry, dealers, jobbers and manufacturers are compiling a list of owners of five automobiles or more, who will be entitled to discounts.

Those not included in this list will be asked to pay the manufacturers' list price for their goods. This action is necessitated by the ever increasing cost of doing business and the desire of every tire buyer to insist upon discounts.

At a meeting of the tire dealers, manufacturers and jobbers of Southern California, they discussed the precarious condition of the industry and a co-operative business policy was suggested to improve conditions.

At the present time dealers are receiving a discount of 21 to 25 per cent on their goods, and it is said that business overhead eats up nearly all of this. This percentage of commission has not been raised in the past four years, in fact, about five years ago tire dealers were receiving in some cases as high as 45 per cent on their sales.

Recently an association of tire jobbers and manufacturers was formed to cope with conditions and to co-operate with the dealer. Frank T. Price is president of the new organization, which is known as The Automobile Tire Manufacturers' and Jobbers' Association of Los Angeles.

Southern Boys Visit Samson and Ford Plants

JANESVILLE, WIS., Aug. 16—Two hundred Louisiana youths, representing 200 of the most progressive farms in their state, sent out by the Louisiana Agricultural College to study farming conditions in the Middle West, learned at the Samson tractor plant here something of the way in which the modern power machinery they use at home is made. They went first to the implement factory where are made plows of all kinds, disk harrows, corn planters, cultivators, weeders and spike tooth harrows.

From the implement plant they went to the tractor plant where 230,000 sq. ft. of floor space is now being utilized and additions under way call for 640,500 sq. ft. They were taken through the motor assembly rooms out to the receiving platforms, where trainloads of raw materials were being unloaded and then watched various machining processes. Their next inspection was of the long conveyors which make possible the progressive assembly of the entire tractor. They were much impressed with all they saw and acquired useful knowledge.

From Janesville the Louisianans went to Madison for a visit to the Wisconsin State University.

Texas Boys at Ford's

DETROIT, Aug. 16—On a tour of the Middle West, South and East, 135 Texas farm boys were here for a trip through the Ford plants as guests of the Ford Motor Co. The youngsters came on a special train and constituted the prize winners in hog raising and farm product contests conducted by the Texas Agricultural and Mechanical College and the Texas Chamber of Commerce. The party spent some time at Henry Ford's farm, watching the tractors in reaping, ploughing and pulverizing demonstrations.